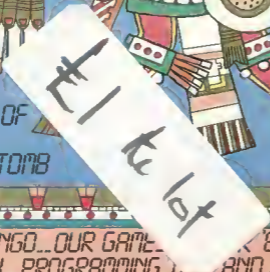


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COMPUTER & VIDEO GAMES

JANUARY 1983, Vol II, No. 2.

GAMES NEWS

18 Take a quiet ride in the country with those nice Duke boys aboard the General Lee, and solve the mystery of the Time Gun.

VIDEO SCREENS

28 E.T. fever is sweeping the country, and we're joining in, plus news of the new some System X.

ARCADE ACTION

30 If ever a game captured the heart of an editor, Froggie was it. He wanted to change the column's name to Arcade Action after playing the "Game of '83", but we persuaded him to find room for some Dig Dug tips too.

REVIEWS

98 There's a round up of starred games for the Spectrum, plus Vic chess.

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32 Take your helicopter out over the icy seas and tackle the enemy hidden below the waves. Your task is to seek out and destroy the alien subs but keep a wary eye on their protective destroyers.

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38 Yes, its those little creatures with the big appetite back again in this special adaptation of our Game of the Year, written this time for the Vic 20.

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42 In days of old when knights were bold, they never had to use a table tennis bat to fight dragons with! There's no time for chivalry here — just aim for the fire breathing beasties' molars and knock them out. Dentistry made easy on your Dragon.



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45 Feet Want to grab a gold record? Well here's your chance. Sneak around a maze and bag the bullion on your Acorn Atom.

CURSE OF THE AZTEC TOMB

46 In the darkest recesses of an ancient tomb there is a treasure so mysterious that it is only mentioned in whispers. Only ZX81 owners will be brave enough.

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50 Zapping through narrow tunnels in your Pet.

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52 On a mission to save your planet from an energy crisis your space freighter is stricken with a terminal illness. Dare you program this game into your BBC micro?

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56 Arcade alien action for Spectrum owners as a convoy of nasty beings sweeps across the universe with one aim in mind. To wipe you out.

CRITICAL MASS

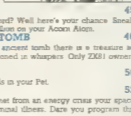
58 Overcrowding could prove fatal in this board game which really goes with a bang. Explosive intellectual action for TRS-80 owners.

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62 Tactics and quick thinking are what you need to beat the computer at its own game on the Sharp MZ-80X.

TARGET

68 For Texas TI 99/4a owners with a death wish.



Just when all seems lost that cavelry bugle sounds and the Indians take flight.

But that may be true of films but don't expect it in our Warpath game.

Ron Potkin is serialising his thrilling wild west war game in such a way as to improve your own programming skills.

Ron is a self-confessed memory miser and a Briton whose games earned a special prominence in the US's micro computer infatasy.

At the end of the series, you'll not only have a game which John Wayne would excel in, but enough knowledge and a working base on which to build your own wargame scenarios.

Turn to page 58 and take to the Warpath.

MAILBAG

7 Telling points, tips and advice.

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16 Our unique gamecompetition starts next month but here's a chance to check out the rules.

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25 T Hunch taught with the Graphic Real time Organic Programming Express notes language.

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27 Max Brancor goes by the book.

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72 Three hand held space invaders are up for grabs if you can shoot down ours.

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75 Alan Hiron holds a branch search meeting.

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78 Inside the microprocessor, with Ted Ball.

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82 Developing a plot. Keith Campbell puts a few verbs in the analysis pot.

WARPATH

88 The start of our series on wargaming.

GRAPHICS

97 Gerry Marshall reads between the lines, with some rudimentary animation techniques.

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Circulation and advertisement office: Daniel House, 8 Barbican House, London EC1A 3BB. Telephone: 01-475 8596. Advertisement: 01-475 8592.

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Cover: Stuart Binks. Next issue: January 1983.

BEFRIEND AN ALIEN TODAY

NEXT

In Space Watch we first invited you to befriend the aliens, long before anyone had seen a pirated copy of that E.T. character.

Now our science fiction specialist, David Langford takes the diplomacy before galactic destruction one step further with Taming The Invaders.

This really is a game with a message, in fact there's lots of messages, all sent by you — the player — to the teeming millions of confused space creatures thronging our atmosphere.

There's getting to be so many of the little green devils out there that they'll soon be in danger of polluting

the atmosphere. Can you successfully find the alien code to persuade them your species is intelligent?... Is this asking too much of C&VG readers? No, of course not!

Follow the second article in our Warpath series, which not only promises to tidy up and speed up your programming, but also gives you a fully-fledged Wild West war-game at the end of the article.

There's also some classic games waiting for you between the covers: Crazy Kong relives the thrills of a well-known arcade game; Escape from the Pyramids of Mars; Over the Orchard Wall; Airline Pilot; Golf; Pompeii and many more.

NEXT
MONTH

more on the news-stands.

You will notice that the February issue of *Computer & Video Games* stands out a little

This is because it is not alone on the shelf but closely cloistered with a friend, *The C&VG Book of Games*.

Forty-eight pages of games for all the popular computers, tightly packed into one super free supplement to ensure that the Christmas micro is put to good use.

Of course we won't be cutting down the usual high quality content of the magazine, we've just been working specially hard, looking out and testing extra programs for the *Book of Games* and we hope you think that it's been worthwhile.

Let us name just a few: Star Trek, Snakes, Ghosts, Victorian Sewers, 3D Maze, Space Attack, Golf, Word Find, Magic Square, Red Alert and others too numerous to mention. Be sure and get your free *Book of Games*. Newsagents have been warned to expect the rush from Saturday January 15.

THE SEVENTH EMPIRE GOES TO WAR

The Seventh Empire will be at war as from the February issue of *Computer & Video Games* and we want you to get involved in the conflict.

A rulebook is on the way to all of you who have so far entered this unique play-by-mail game but the rules are also briefly outlined for the curious on pages 18 and 17 of this issue.

If you haven't yet sent in your entry form then please fill in the form below straight away and despatch it to us. Because of the strange deadlines imposed upon us by Christmas holidays, only those forms which reach us by December 21st will be entered for the first round of the game in our February issue. Any entries which arrive later will be included in the March issue game of Seventh Empire.

The Seventh Empire is a unique game/competition which will only cost you the price of a stamp each month. Specially designed

for C&VG by Mike Singleton, the inventor of Britain's top computer-moderated-game, Starlord, it can be played by up to 10,000 readers.

There will be a winner each month and an overall winner over the entire run of the game. The winner of our first turn in February will win a Colour Genie home computer.

Every player will control one of the galaxy's many tribes with seven space fleets to despatch around the star system. He will lure his fleets out as mercenaries to take part in the conflicts between rival empires, choose plum planets rich in resources to raid, commit acts of piracy on rival fleets or trade his way up to a high score by careful watching of the galactic fortunes and commodities.

The game is moderated by a Commodore Pet computer at our end but there is no luck in the play, only skill, foresight and

sheer animal cunning. Each month a new galactic map will be published in C&VG to show ship numbers at each star system and help you work out your tribe's profits.

We will also publish battle reports which may have changed the face of the galactic map. A diplomatic diagram which will show how the empires have reacted to wars and raiding ships, which empires are currently at peace and which have declared war.

Information on where the imperial ships are travelling to and a Gateway chart which will show which of the 800 or so routes were hit by pirates. From this information you will be able to piece together your score for the turn.

At our end the computer will come up with a top 10 high scorers for that issue. Scores will vary from several thousand points amassed to minus figures for those who traded badly.

Send the form below to: The Seventh Empire, Computer & Video Games, Durrant House, 8, Herbal Hill, London EC1R 5JB.

Several of you sent in entries on letters and other pieces of paper last month and we decided to accept them, but if you are a new entrant please send off this form on the left cut out at the dotted line.

**Please include me in the Seventh Empire Competition.
The name of the tribe I will play in the game is:**

My name is:

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BIRTHDAY BOUQUET!

Dear Editor,
Happy first birthday from one of the countless satisfied readers — and shame on you for not mentioning it yourself!

Yes, it was one year ago that *Computer and Video Games* first hit our news stands. And what a year it's been! Twelve excellent games programs for the Atom, Fabulous articles and artwork, great reviews and your little cartoon Bugs provide good humour (despite their nasty habits).

I hope you continue for many more years to come with your very high standards of publishing. And as long as you keep printing games for the Atom you'll have at least one loyal reader.

Keith Robertson,
Carshalton,
Surrey

PIMANIA PIMANIAC!

Dear Sir,
I am a Pimaniac! And I'm answering your call in the November issue. First, let me say that Pimania is absolutely fantastic — and with the golden sundial as its prize I have become completely hooked on it.

It might be useful for other readers to note that the way to move around the world of the Puman is completely logical if you take good notice of the clues given just after you get into the program. Unless you spot this you could be wasting days going up blind alleys!

The Puman isn't really as horrible as he makes out, if you learn to treat him right. You'll have to learn what takes his fancy in different parts of his world, and what upsets him.

To tell the truth I still

haven't got a clue where the sundial is — but as long as Pimania continues to keep me rolling about with laughter I don't care.

My friends who have other machines want to know for what other micros Pimania will be produced and when.



While I think that it is good that you will be giving readers hints and tips in your pages, I hope you don't give too much away — it's taken some of us a long time to work out the mysteries of Pimania.

Well done *Computer and Video Games* for bringing us news of Pimania first! Keep up the good work
Raune Morris,
Streatham,
London

Editor's reply: The micros next in line for Pimania are the Dragon 32 and BBC Model B planned sometime for the New Year.

AND HERE'S ANOTHER!

Dear P-men,
Does the line the Pimania song "I haven't got a lot of hair" refer to Clive Sinclair, and is the world of the Puman inside uncle Clive's head? Also is it the man himself in the background at the end of the song? Also is it Ian Dury who does the vocals?

Does the can of worms refer to one of your earlier sets of games and can I use the megaphone anywhere? Is the Pi symbol significant?

Lastly, when the Puman tries to sell me a tee-shirt, is this part of the game or are you just trying to get more money out of me? By the way, I have become completely addicted to the search for the golden sundial of Pimania, and I'll find it if it's the last thing I do!

Jennie Barratt,
Kowloon,
Hong Kong

Editor's reply: Here are the answers to your questions from Automata.

No.

Who knows what's inside Clive's head?

If we had asked him to the recording studios he would have turned up 18 weeks late!

No comment.

Yes.

Yes.

Totally!

Of course it's for more money.

SOFTWARE WORRIES . . .

Dear Sir,
I own a 32K Atari 400. I'm becoming very concerned about the service being offered by some software firms. Quite a number of firms are offering programmes for the Atari knowing, and freely admitting that they have no stocks at all of the material and in some cases they do not even have a delivery date for when stocks will be available.

In some cases the problem is that the firm, in all innocence has misjudged demand or has been let down by a supplier.

However, in some cases failure to supply appears so common that the suspicion must arise that virtually no stocks are held and the firm waits for a customer's order

before contacting the wholesaler.

Having parted with your money, getting hardware repaired or defective software replaced is not easy. At the time of writing my Atari has been away a month having a "mirror" fault repaired.

M. P. Nicholson,
Bridgwater,
Somerset

QUESTIONS ANSWERED

Dear Sir,

I have a few questions to ask about the ZX81. The first question is whether or not you can invert the screen so it prints black on white and if so how do you do it? Also there is the question of where you can get a cheap hi-res graphics card?

I have thought of a great idea! Why don't you have a place in your magazine where people can send in small programs they have written for small amounts of money?

Finally, I am thinking of buying a ZX Spectrum and selling my ZX81. What would be the highest amount of money I could get for it?

J. Morton,
Bishop Auckland
Co. Durham

Editor's reply: To invert the screen, try the graphics toolset from JRS Software or even the 4K graphics ROM from DK Tronics. This will also provide hi-res graphics. Kayne also do a cheap hi-res graphics board.

Many of our contributors tell us we already pay "small amounts of money" but if anyone would like to send in small routines for getting around certain problems we will look at the possibility of starting up such a page. Finally, I think you could expect around £25 for your ZX81. Mr Morton.

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MAILBAG



THANKS FROM A TEXAN!

Dear Sir,
A big thank-you *Computer and Video Games* for a program for my TI 99/4a. I am now buying your magazine not just skimming through it at a bookstall! I am certain many T1 owners, there are a lot of us out here, will be doing likewise.

Will you be inviting programs suitable for the TI 99/4 or 90/4a? Stay on the Texas bandwagon
Bernard Bailey,
Althorne,
Essex

Editor's reply: We are always interested in new and original programs
Bernard. How about sending us some of your ideas.

MAGAZINE MDANS...

Dear Sir,
I read with interest your article on the TI 99/4a home computer, but the reference to the 99'er magazine at the conclusion of the article was of particular interest — and inaccurate. I would like to take this opportunity to inform you and your readers that MPI of Cambridge Road, Barking are no longer supplying 99'er magazines and would urge them not to part with any money.

MPI said that they were returning my subscription. That was in August and I'm still waiting!

I would like to add that since February I received only two 99'er magazines from MPI which in my book is absolutely terrible service.
M. K. Needham,
Penarth,
South Glamorgan.

SPECTRUM SHDWDDWN

Dear Sir,
I feel it is up to BBC and Atari owners to voice their feelings about some of the facts contained in the Sinclair Spectrum brochure inserted in many computer magazines.

For any person about to buy a computer, I can assure you that the extra money

spent in the purchasing an Atari 400 or a BBC micro is money well spent. Below, are some facts that are incorrect or omitted from the Spectrum brochure.

I own an Atari 400, and I have used a BBC, and they are amazing machines. Their graphics resolution is far superior to the Spectrums, and the comparison of the BBC and Atari's four sound channel to the Spectrum's channel (all one of them), is absolutely ridiculous.

The brochure claims that the Atari computer can only present five colours on the screen at once. This is not true. Three of Atari's fourteen graphics mode support 16 colours or luminances on a 16360 point array, without the intervention of the Atari's second micro, ANTIC.

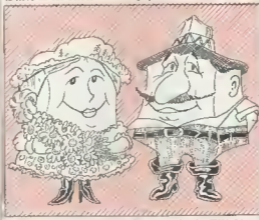
Using ANTIC, it is possible to have all 128 colour

have to be purchased to bring the basic machine up to the standard of most computers.

I'm sure that the cost of adding colour graphics, sound channels, A to D, Hi-res graphics and a neat case to house the arrangement, to any of Sinclair's computers would easily outprice the £199 that the Atari 400 costs, not to mention the amount of processor time available from a single micro that has to look after all of this.
M. D. Caballero,
Ramsgate
Kent.

MICROVADER MUDDLE...

Dear Sir,
I am still struggling with your July issue's Microvaders



luminance combinations on a 61440 array. ANTIC also offers line scrolling windows, player missile graphics, display list interrupts etc.

Any combination of the fourteen graphics modes can be mixed on the screen, and all this leaves the 8502 almost totally free to execute the user's program.

Sinclair's brochure also omits the fact that the Atari has eight easily accessible A to D ports, four joystick ports (which can be used as outputs as well) and a cartridge slot for ROM based software.

This removes the necessity of the Sinclair computers expensive Christmas-tree arrangement of add on that

program for the ZX81. I have noted the corrections which you published in your August issue but I am still not getting it working. In particular line 16 is quite hard to read and I think my error may be in that.

W. Davison,
Scotland.

Editor's reply: Some people do seem to have had difficulty with Microvaders, despite the other way we suggested they approach the program in our August issue's *Confessions of a Bug*. Line 16 may be the cause of the problem.

The third line of line 16 reads: '00285EA00'. This is correct but people are mistaking the 'B' with an '8'.

PRINTING PROBLEMS

Dear Sir,
I have a TRS-80 16K level 2 and have made quite a few good programs which I want to send in to your magazine. However, I have no printer and since most of them want the program printed out I have a problem.

So is there anyone out there who could print out the program for me?

Jan Bailey,
Streatham,
London.

SINCLAIR SOLUTIONS

Dear Sir,
I have recently purchased a Sinclair ZX81 and only just getting involved in the fun of operating it. It is a tremendous piece of equipment especially for its price. We are very limited here in the options available.

Even the range of cassette programs is very limited. If I had the finance available I would certainly like to set up a completely Sinclair based computer shop here in Christchurch.

However, back to reality. I read in your July issue — *Mailbag* the problem that D. McRuer was having with 'Edn' on the ZX81. It seemed related to time the computer had been on but could it be the problem experienced with the ZX when you are running close to its memory limit?

If this is the case then I would suggest the following:
1. Place cursor at the line requiring edit.

2. Depress 'CLS' then 'NEWLINE'

3. Depress 'SHIFT/EDIT' together.

This will clear the screen and put the line that requires edit at the bottom.

Your magazine is excellent and very useful over here with the lack of software games etc. I am currently waiting the arrival of my 16K RAM and then I will be able to really get into some clever material.

John Mitchell,
Christchurch,
New Zealand.

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Then there's the question of the manufacturing expertise necessary to ensure the quality of the tapes will give the best possible lead for your prospective purchasers.

Marketing expertise will help put the best package around the tape and make sure that the program gets maximum exposure in the right media. Advertisements must be designed for real impact and a knowledge of which specialist press to place them in, would be handy.

And how about distributing the cassettes once the purchaser's appetite has been whetted. Getting them into the computer dealer shops, setting up a mail-order system.

Never realised how much work these software houses have to put in eh?

Well that's the promise we are tethering to our new **Games Program of the Year Competition**.

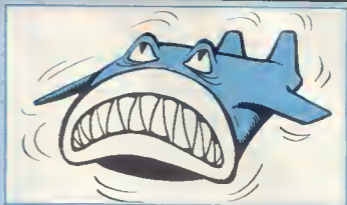
Starting in our December issue we are carefully sifting through your games listings, looking out for that program we consider to be something special. And come next November we will take the writer of the best games program we receive and hawk both him and his program around.

We will take him to a top software house and get their advice on tidying the program up, securing it against software pirates, giving it that final professional polish.

We'll have a top audio company brought in, to bring out the copies of your tape in prime condition ready for loading.

The next stage in the program hype will be to have a marketing company design an advert and advise on cassette packaging. Our top reviewers will help compose the instructions on the inside leaf of the packaging.

And then we'll throw the entire weight of *Computer and Video Games* behind the program and an advertising campaign in other com-



puter magazines aimed at giving it maximum exposure over the whole marketplace.

We'll have the cassette distributed, set up a mail order system to deal with its sale. And at the end of the month, having fully emersed our winner in the tricks of the trade and given his cassette the sort of treatment even top software houses would struggle to equal *C&VG's* top programmer will be able to sit back over Christmas and wait for the money to come rolling in.

So start work on your next contribution to our games listing pages as soon as possible... after-all last year's winner, Nibblers, was published in the very first issue!

MEET ARKRAIDER THE DUSTMAN

Our readers' special guide to computer moderated space thrills, *Starweb*, is still producing thrilling reports of galactic intrigue.

This month we publish one we received from one of the universe's more distinguished beings. Arkraider the artefact collector. His tale of space pirate harassment of the galeatic innocents is narrated by Jimmy Parsons.

It's a hard life for a bumbling old fossil like me, you know, trundling around the universe collecting up unwanted artefacts. Well, if others are careless enough to leave them lying about

By the way, I'm Arkraider, archaeologist extraordinaire — a sort of galactic dustman. My sole aim is to load rare treasures on to my somewhat battle-scarred and

dilapidated fleets and creep off to some planet where I can gloat over my acquisitions.

Trouble is, there are constant interruptions. Pirates! Dastardly bands of do-badders, always plundering, more evil than Long John Silver and Captain Hook combined.

The universe is plagued by an overdose of bad guys. Berserkers, intent on blowing my world to smithereens and sending vast herds of rampaging robots to terrify my peace-loving people. Empire Builders, fiendish, power-hungry magnates on perpetual ego-trips. They remind me of the American Presidents on Earth, years ago.

But, I digress. There are some half-way decent chaps about. Merchants, for example. Hyperspace hypermarketeers, these are relatively harmless.

Mind you, like all salesmen, once they get their foot in the door The Apostles are pretty bearable too, although, when I arrive home after a gruelling voyage, to find my people in the grip of religious mania, it becomes very wearing.

I've had some experiences in my time. Once I found a wonderful prize, the fabled and mystical Black Box! Imbued with legendary powers, was I in luck? No, I wasn't. It disappeared, before my incredulous eyes Vanished into the great void. On more than one occasion I've been ambushed en route to some fabulous jewel and left for dead.

What's that you said? The Ancient Pyramid has been sighted on the other side of the galaxy? I'm off!

TIM THE INVENTOR'S FOUR-WHEELED WINNER

Buggy is a design for a machine code arcade-type game requiring skill and quick thinking.

It is the invention of Tim Sellurk of Bunny in Nottingham and was judged to be the pick of the bunch of program ideas sent in by you for our September Design a Sinclair Program Competition.

Tim has won for himself a set of five ZX81 Psion cassette games and a Sinclair printer.

He has also earned the chance of a trip down to London to look around Psion's software house and see their game design team in action and talk about Buggy with them.

Charles Davis of Psion, who was part of the judges panel who checked over the entries for the competition explained the strengths demonstrated by Buggy

"We felt Buggy deserved to win because Tim had considered the practicalities of putting his game onto a computer, in some detail.

"He clearly appreciated what could and could not be done and went further and suggested details of the application. He has developed the makings of an amusing and exciting game. The presentation is excellent and Buggy certainly has a realistic potential."

The Buggy in the title, moves over a scrolling landscape which includes a series of water jumps. The track is produced randomly at the right hand side of the screen and by changing gear and speed the car manoeuvres over the terrain, picking up speed for the water jumps.

Although the idea sounds similar to one of the current arcade games,

its way of coping with the jump problems is quite original and Tim has gone into some depth working out the best way to approach the problems involved in the game.

Buggy sounds a fascinating game, and if anyone out there would like to try and use Tim's many diagrams, flow-chart and extensive thoughts on the game, to turn it into a working program, please send a stamped addressed envelope into us and we will dispatch a copy of Buggy rules to you.

Four runners-up in the competition will also receive the five Psion ZX81 cassettes as a prize.

The runners-up are: Maggot Mania by Paul Dobson; Hang Glider by Bernard Isherwood; Tightrope Walker by D.M. Harris; and Strategic Command by Ben Bryant.

PUZZLING SOLUTIONS

We thought we'd catch a few of you out with our sneaky Mastermind Competition in November but you were up to the challenge.

The vast majority of entrants spotted that Puzzle C had been altered to make it possible.

First three out of the hat with all four answers correct were: George Stout, The Walk, Potters Bar, Herts; Ivor Davies, Bryn Road, Brynman, Dyfed, and Robert Funai, Craig Court, Garvan, Ayrshire.

Congratulations and Invicta Electronic Masterminds are on the way. If you can shoot down the invad-

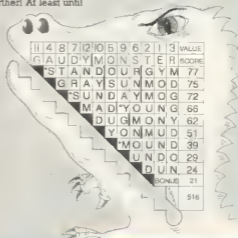
ers in Space Attack on this month's Puzzling page, you could win a Computer Games' hand-held space invader game. We want your entries in by January 14th at the latest and the first three with the lowest possible solutions will receive the prizes. Full details on page 72.

Right, for those of you who complained that they read the November issue's Puzzling answers before they got a chance to try the puzzle... read no further! At least until

you have glanced at our Gaudy Monster and Omnidose brain-teasers.

If you're still with us I assume you have already looked at pages 72 and 73. Here is a sample solution for Gaudy Monster which scores 516 points, let us know if you have a better score.

And left are the dominoes, successfully pieced together from Mr Wheel's diagram.



11	4	8	7	12	0	5	9	6	2	1	3	VALUE
G	A	U	D	Y	M	O	N	S	T	E	R	SCORE
S	T	A	N	D	A	I	M	O	G	Y	M	77
G	R	A	I	S	U	N	M	O	D			75
S	U	N	D	A	I	M	O	G				72
M	A	D										66
D	U	G	M	O	N							62
Y	O	N	M	U	D							51
M	O	U	N	D								39
U	N	D										29
D	U	N										24
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News Sir! The alliance between the Water Empire and the Sun Beings has crumbled, war is declared.

Three of your fleets are currently in Water Empire systems annecting sun-rich Hotek. This could be the chance you have yearned for. Other tribes affiliated to the Water Empire also feel the time is right, shall I give the orders to grab our share of Hotekian plunder?

The galaxy of the Seventh Empire is torn by war and piracy. The merchants are as coldly calculating as the war fleets. Playing off warring empires against one another, a cunning commander can keep his tribe in

profit! But he must keep a close eye on the way the diplomatic wheels are turning, how other tribe's fleets are responding.

He must know when to plunge into the risks of battle and try to seize the galactic map and he must use the Gateways wisely, running merchandise or raiding the profitable routes.

The Seventh Empire is a new way to play a game. It is quite unique in the history of publishing, computing and gaming. This one-way play-by-Mail gaming is the brainchild of Mike Singleton who runs Britain's top computer moderated game, Starlord.

The players send in orders for

their fleets by post but get feedback through the pages of this magazine and it can cater from two to 10,000 players. At our end it's run by a Pet computer and all the player's orders are input into it each month.

It works out how their interaction affects the galaxy's 100 centres of population and industry. The result is displayed in the following month's issue by use of a map showing how the fleets have moved. This is not information on each individual fleet but the numbers to be found on each star and how that has altered its trade index. With a diplomatic diagram showing how the empires are shaping up for war;

a Gateway route table displaying the profits on each route and some battle reports from the areas of galactic conflict, the player can find out exactly how his fleets fared and plan out his next movement commands.

The rules are set out briefly here, but each Seventh Empire player will be sent a detailed rulebook before the game gets underway in our February issue. You'll find it easy to understand the rules and simple to play but very difficult to win and work out tactically. Remember, there is no luck in The Seventh Empire — only foresight and galactic understanding! An airy form is on page 4.

THE SEVENTH EMPIRE

There are 100 named stars in the galaxy, arranged on a 10x10 square grid, representing major centres of galactic society.

Each star system belongs to one of seven empires: Water (blue), Bloodline (red), Sun (yellow), Amythest (purple), Deed (brown), D'Teen's Science Empire (green) and the Pirate Empire (orange).

There are four types of stars: Gateway Stars provide rapid transgalactic movement, Energy Stars contain planets rich in the stellar energy used for ordinary inter-system space travel, Gem Stars produce the amythest-like crystals which are used to harness stellar energy, and Eluxir or Life Stars contain the sun polyps which can run unassisted planets into those capable of supporting life.

Each planet has seven star-fleets under its control and each of these is considered the property of the empire from whose star it starts its turn. A player can have starships in as many empires as he wants and by sending these ships on missions from star-to-star, he tries to build up his profits.

GAME TURNS

A simple turn sheet must be sent in by the player, every month which records where he wants his fleets to travel to. And whether each one should be involved in battle, piracy, trade, raiding or just moving from star-to-star.

These orders are processed by computer so that all movement happens simultaneously. A printout of the galactic map is produced, each player's individual record updated and the winner of that turn found.

From the information given in that issue of the magazine, the player can calculate what happened to his ships and what profit he made.

You should keep a copy of your moves for this purpose. The computer keeps its own records but if you miscalculate, you could be playing with delusions of grandeur.

STAR TYPES

The four star types are represented by different symbols on the galactic map and each has a trade value: Gateway Star = 50, Energy = 100, Gem Star = 150 and Eluxir Star = 200. Each star is in a square on the map, the colour of the square indicates which empire it belongs to.

Stars represent whole systems which have been colonised and each of the 100 is considered by leaders to be special at providing one of the four galactic commodities which produce real profits. A symbol shows which star type each is.

The star name is what you should use in your orders to show how you intend to move. Other data on the star includes the number of ships in that star system at the end of a turn (bottom left). And in the bottom right

is a number representing the Trade Index of the star for that turn, from which you calculate your profits (see example).

AT WAR

The seven empires are continually at war with one another. This is represented by a diplomatic diagram concocted of seven different coloured circles. It will be printed each month to show the empires at peace and those at war.

When two circles are joined by a line, those empires are at war with each other the following turn. Two empires, whose circles are not joined are at peace with one another.

The diplomatic diagram changes according to the last turn's events. Every empire checks on how many ships from each of the other empires, raided its stars. It then declares war on the empire which did the most raiding of its territory.

This empire responds by declaring war also. If there are two empires guilty of equal raiding then war is not declared. Careful study will help here.

The diplomatic diagram is important because it restricts the moves a player's fleets can make on the following turn. Trade and Movement cannot occur between stars of two empires at war.

Likewise, a fleet cannot be given an Attack order that moves it between the stars of two empires at peace.

MOVING OUT

Each game turn consists of two movement phases. In each movement phase you can move any or all of your fleets, so each ship has up to two movement orders. There are three basic ways to move:

- 1) **Travel Mode.** A fleet moves to any adjacent star, horizontally, vertically or diagonally. This mode is used in Trade or in Movement. This mode takes one phase to complete.
- 2) **Attack Mode.** A fleet moves to any adjacent star, horizontally or vertically but not diagonally. This mode is used in Raid or in Attack. This mode takes one phase to complete (see example).
- 3) **Gateway Mode.** A fleet moves from any Gateway Star to any other Gateway Star. This mode is used in Cargo (Gateway travel), Jump (gateway movement) or in Plunder. Unlike the other modes of movement, this mode takes two phases to complete.

TRADING

The star Trade Index is the key to most profit in the game of The Seventh Empire.

Each star is given a fresh Trade Index each turn. A number of factors come into the calculation. Let's consider one star.

- 1) The total number of fleets leaving the star on Trade missions on both phases of the turn is the number of Broyers.

- 2) The total number of fleets arriving at the star on Trade missions on both phases of the turn is the number of Sellers.
3) Each star already has a Trade Value by virtue of its star type.
4) Trade Index = Trade Value x Buyers - Sellers

The trade index is used when calculating the profit to be made on a Trade mission. Trading from star A to star B:

PROFIT = TRADE INDEX B - TRADE INDEX A

If you go from a star with a low Trade Index to a star with a higher Trade Index you make a profit. If you do it the other way round, you make a loss (see example).

Gateway trade (Cargo) does not influence the Trade Index and profits on this are calculated differently. You can still do ordinary Trade with a gateway star, however.

On each turn, an overall Raid Penalty is announced. It is used in calculating losses due to damage during a raid on an alien empire's star. It varies according to the number of planets in the game, we will announce it each issue.

BATTLE ORDERS

Battles will be said each game turn, but some obvious targets will present themselves each month. And, if successful, these can change the galactic map.

A fleet travelling from its empire to a warring empire can be given an Attack or Raid order. If an Attack order is given on the first movement phase, no subsequent order can be given to that fleet.

A fleet can only be given an Attack order on its second movement phase if it stayed in its own empire on the first phase. In both cases the Attack mode of movement is used. Fleets on Attack orders stay at the star they attack (see example).

The result of an Attack is calculated as follows:

- 1) Defending ships = number of owning empire's ships at end of turn.
- 2) Attacking ships = number of alien ships from all empires there on Attack orders from both movement phases.
- 3) The defender's ships are compared with the attacker's ships. Whoever has the most, wins. In the cases of a draw, the defender wins.

All the fleets of all the attackers and the defenders become the fleets of the victor. Any fleets from the losing empires

lose all their profits. Fleets on the victor's side gain an additional Battle Bonus.

FLEET ACTION

As well as moving between stars, a fleet is also given an Action order. These are as follows:-

Move - no action, just movement.

Trade - taking goods from one star to another.

Raid - plundering an alien empire's star.

Retrain - returning from a raid to own empire's star.

Attack - moving to an enemy empire's star for battle.

There are also the following actions which can take place when using the Gateway Mode of movement:-

FUNUS 13 808	LULIP 79 400	YANOK 48 458
VEDPOZ 68 600	QATDT 16 600	HEZOD 72 132

Fig 1

1st Movement	phase	2nd Movement	phase
DESTINATION	ACTION	DESTINATION	ACTION
Fleet 4 at Lulip	Quiet	Raid	Lulip
			Retrain

In the example above are one raid system. These are stars or class primarily where other systems are capable of supporting life in such quantity that the system is considered a Trade Centre.

The second system in Fig 1 is a Gateway star represented by the asterisk in the centre. The 72 number represents the 72 star capacity based on planets in the system and the Trade Index is 132 for this star.

Funus and Vedpo are both 8th class planets represented by the 68 symbol on the table. They are taken when a ship moves between them. It is noted that it is possible to move between Funus and Vedpo. The first movement phase will take your fleet to Lulip. And then on the second movement phase.

Funus, Lulip, Yanok and Hezod are all in the

between two stars. No profit or loss will be made. Move orders cannot be given to a fleet travelling between two stars of empires at war.

A fleet travelling from a star of its own empire to the star of an alien empire can be given Raid orders. It must use the Attack Mode of movement and the Raid order must be given on the first phase of movement. On the second phase of movement the player must give a Retrain order to the ship, in which it must go to a star belonging to its own empire.

Profits are calculated as follows:-

T = Trade Index of raided star

F = Fleets at raided star at end of turn

R = Raid Penalty

Profit = T - (F x R)

attacked + Battle Bonus

A Stay order is just that, staying at a planet. Any illegal order will be changed to a stay order and no profit gained.

Stay orders have no effect on trade or profits but may affect battle.

GATEWAYS

A fleet moving in Gateway Mode between two stars can be given Cargo orders. This order has nothing to do with the normal Trade Index of the Gateway Stars. The profit is calculated as follows:

Profit = 1000/Sqr (number of fleets using same trade route)

If the route a fleet is taking is Plundered all profits are lost.

With Jump orders no profit or loss is made. It simply moves.

A fleet moving in Gateway Mode between two stars can be given Plunder orders. If any other fleets are trading on the same route they lose all their profits. If no ships are trading on the same route then the Plundering fleet gets no profit. Any profit from piracy is calculated as follows:

Profit = total traders' profit/number of pirates on route

The Gateway Route Table is a reference guide to the profits made by taking a particular gateway route. The star of departure is given by the row and the star of destination is given by the column. Cross referencing these, you will find the box corresponding to travel between those two stars in that particular direction. This is the gateway route. The box will show one of two things:

- (1) Black figures on white background = Gateway Trade Profit - no pirates on route.
- (2) White figures on black background = Pirate Profit - the profit each pirate on the route makes. Trade is not profit.

Each empire is run by vast computers, crossing the galaxy in huge ships which react to the data the tribes put into them. They are invulnerable and, if at a star, that star cannot be taken in battle. They do not trade, battle or raid and can never and their turn in an alien empire's system.

Any fleet ending its turn at the same star as an Imperial Ship will have its profits doubled.

The richest player in each empire takes control of the imperial ships that turn. But there is one condition, the only players considered are ones whose fleets all belong to that empire.

Return orders can only and must be given to a fleet which has just made a raid. It is like a Move order, carrying no profit, but it must be made on the second phase of movement and movement must be in Attack Mode. It must also be made to a star of the same empire as the star the fleet started its turn at (see example).

Battles can either profit the defender or the attacker. Fleets on the losing side lose all profits. Victors gain an additional bonus Bonus = Losers' total profits/number of winner's fleets.

The Battle Bonus will be noted for each turn in the Battle Reports section.

If an attacker wins then each fleet profits as follows:

Profit = Trade Index of star

NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW GAMES NEWS

SAVE THE FINAL FEW HUMANIDS

ABDUCTOR

The aliens are out to capture the last sex remaining humanoid on planet X and it is your task to stop them.

They swim down towards you looping-the-loop — like bugs hovering around a lamp shade — and then swoop down and grab one of the humanoid.

The humanoid is then carried dangling from the alien craft up towards the top of the screen where he comes to a sticky end. The aliens having extracted all the vital organs for experimental purposes then toss the skull down towards the planet's surface.

The aliens attack in five waves. If you manage to survive to the fifth wave you are awarded an extra gun — which you will need as the aliens multiply in numbers and also become much faster and difficult to shoot.

When the last humanoid has been abducted that marks the end of the human race so you are charged with a mighty task.

Abductor runs on an unexpanded Vic 20 and is the latest addition to the Llamasoft range of software for the Commodore machine.

It sells at £5.00 inclusive from the Hampshire-based firm

MISSION TO FIND THE GATEWAY...

TIME GATE

A four dimensional game is the manufacturer's proud boast on the cover of this latest space game for the Spectrum.

Your mission is to travel back through time to destroy the enemy before they reach their evil plot of intergalactic tyranny.

The game displays the view from the cockpit as your ship hurtles through space past stars,



planets, galaxies and ultimately towards the Time Gate.

Once through this you can attempt to shoot the aliens who appear momentarily in front of you.

You are armed with photon torpedoes which you must fire at the aliens to destroy them.

The ship is equipped with impressive flight and battle control computers.

Short range radar enables you to train your photon torpedoes accurately on the aliens.

Long range radar shows you the number of aliens in any given galaxy and their positions.

There is also a jump drive which enables you to race through time.

The game comes complete with a keyboard overlay to simplify the playing buttons on the computer.

The ships computer records the level of damage sustained and the number of aliens downed. There is a lot to concentrate on so only experienced space pilots need apply.

Time Gate is the latest game from Quicksilver of Southampton. It runs on a Sinclair Spectrum in 48K and costs £6.95.

IMPROVING YOUR TUNNEL VISION...

3D TUNNEL

3D Tunnel is the latest offering from 3D expert Malcolm Evans, the man behind 3D Monster and 3D Defender — the J. K. Gieve games that have sold more than thirty thousand tapes between them.

The 3D effect is created by a sequence of ever decreasing squares which your craft passes through, creating the effect of depth as the squares appear to disappear into the distance on your screen.

As you pass through the tunnel a number of adversaries will attempt to stop you. You will have to deal with rats, bats, rabbits and even an express train hurtling towards you from the depths of the tunnel.

You can shoot these obstacles or try to dodge them.

3D Tunnel runs on a Sinclair Spectrum in 48K or 16K and is available from New Generation Software of Bristol at £5.95.

THIS COULD BE A REAL BOA!

SNAKES

Snakes introduces you to a wriggling maze of the colourful but deadly creatures. You are in control of a grinning blob and using this you must outwit seven menacing snakes which wriggle and twist around the screen.

At the start of the game, the screen is filled with tiny eggs which your blob must consume

to score points. The snakes are willed in by lines of eggs but these are soon consumed by the red snake thus releasing the other snakes.

The action is now fast and furious as the snakes chase after you hungry for a nice juicy blob. When all the eggs have been consumed phase two of the game commences.

Now it is the turn of the blob to get its revenge as it can now eat the snakes. To do this it must land on a snake's tail from whence it will champ its way along the entire length of the snake to gain 200 points.

The blob is moved using either a joystick or the keyboard.

Snakes runs on an unexpanded Vic 20 and is the latest addition to the Pastern range of games. It is available from the Cheltenham based company at £6.99.

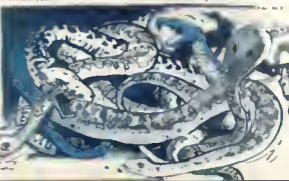
THE ACTION PACKED PACKAGE! GAMES PACK 2

Three games for under a fiver is this latest value-for-money package offered for the ZX81.

The games are all action packed — City Bomb places you on a bombing raid over a deserted city with the mission to destroy as much of it as possible.

3D Battle places you at the cockpit of Starblazer Cruiser hurtling through space at the speed of light. You are attacked by alien death ships which are spinning towards you intent on your destruction.

Gridball is a two player type tennis game — with both players operating their players with the keypad control keys. The cassette is available from JRS Software of Worthing at £4.95.



NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW GAMES NEWS

COME FLY FASTER WITH US!

ASTRO CHASE

Astro Chase adds a number of new features to the space war type game.

You are the astronaut aboard an inter-galactic spacecraft and the aliens are attacking.

But they are not just attacking from the space immediately around your planet but from throughout the entire universe.

This greater distance necessitates the simulation of greater light distances created by the innovation of something called Single Thrust Propulsion. This enables the ship to fly fast over great distances whilst still able to manoeuvre and live at the attackers.

Astro Chase is a recently imported game from the US for the Atari 400 or 800. It is sold in this country by Gemini Electronics of Manchester at £19.95.

Also new from Gemini this month is a 3D diving game called Baje Buggies.

You are diving across the desert steering to avoid the oncoming traffic.

The lead weaves its way across the yellow sand as the sun blazes away in the see blue sky. The screen also displays the speedometer.

The game requires 16K of memory and costs £19.95.

JOIN BILBO ON HIS DRAGON HUNT

THE HOBBIT

The Hobbit — J.R.R. Tolkien's masterwork of imagination and lyrical prose has been converted to the computer.

Your mission is to seek out the evil Dragon and return the treasure he hoards back home.

As a secondary concern, you must look after Thoinn the Dwarf and protect him. Should he be killed during the adventure, it is most unlikely you will be able to



survive the dangers ahead of you.

You will meet many of your favourite characters from the book including Gandalf, Thorin, Gollum, the Elves, and many others. Each of these characters has the ability to make decisions, interact, and communicate not only with the player but also with the other characters.

The program is part graphic part adventure game.

The Hobbit runs on a Sinclair Spectrum in 48K. It comes complete with a full colour instruction manual and a copy of the book, *The Hobbit*.

The package is available at £14.95 from Melbourne House publishers of Leighton Buzzard.

WHAT A LOAD OF RUBBISH!

TRASHMAN

Trashman is the latest variation on the Pacman theme featuring giant flies, garbage and you as the unfortunate dustman with the job of cleaning up all the mess.

You are a trash collector scouring the city streets to pick up the various garbage which is represented on the screen as a series of dots.

There are a number of added dangers for you dustman to be aware of. A super-sized of giant flies have sprung up feeding on the debris. These flies have grown to man eating proportions and are beginning to change their diet to include the local population as well as the garbage.

To fight the flies the council have invested in a laser remote control garbage collector in the hope of removing the flies diet of garbage.

There are also six green trash cans placed around the city streets. If you pick up one of these the flies are temporarily weakened and you can run them over with your trash truck. But you will have to be quick as the flies are not weakened for long.

Occasionally a bit of bonus rubbish appears at the centre of the screen for which you can earn bonus points if you manage to pick it up.

Trashman is the new cartridge game from Audiogenic for the Vic-20. It is available at £19.95 from the Reading based firm or from any Vic dealer.



DR. DEATH MEETS MR BOND

SHAKEN NOT STIRRED

Secret agent 007 comes to the screen of your computer.

The game kicks off in true Bond style with an action packed scene in which a jet carrying a nuclear missile is stolen by the baddies. Your mission is to locate the missile and neutralise it.

The game introduces the evil Doctor Death who is holding the world to ransom.

The missile is hidden in a three dimensional maze in Doctor Death's underwater lair.

The maze is patrolled by Paws who is Doctor Death's top henchman.

With sheer luck or Bond like professionalism you may reach the missile control room. All you have to do now is crack the secret code.

Shaken but not Stirred runs on Sinclair Spectrum in 48K and costs £6.50 from Richard Shepherd Software of Maidenhead.

MISSION TO DESTROY THE DEATH STAR

SPACE WAR

There is a strong flavour of Star Wars in this latest game for the new Dragon computer.

You are at the controls of the sole surviving star fighter on a mission to penetrate the Death Star defences and destroy it.

Enemy fighters are circling the Death Star and may blast you with their ionocades at any time.

It is not only enemy fighters you have to worry about. There is also a black hole with a strong gravitational pull.

The space around the Death Star is littered with invisible space mines which can only be detected by listening carefully for a sonic alert which they will emit before they explode.

Space War is available from Microdeal of Bodmin, Cornwall, at £9.00.

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J.R.

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A comprehensive version of the original card game with hi-Res graphics

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32K

BBC MICRO

£7.45

ROW OF FOUR

Try to outwit your computer opponent in this game of skill. Great graphics. BASIC and machine code. 32K

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PHARAOH'S TOMB

30 Maze Game and Adventure rolled into one! 48K

SPECTRUM

£6.95

SPACE KINGDOM

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BBC MICRO

£7.95

TIME TRAVELLER

Travel through over 100 rooms in different times and find the way back to your own time. 32K

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Envelope program, variable print, text scanner and memory dump. 32K

BBC MICRO

£7.45

CAR WARS/ALIEN PLANET

Two addictive graphics games, one BASIC and Machine Code

32K

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£6.95

DANGER ISLAND

An adventure game in which you fight your way through many obstacles to escape

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Disassembler program or text and text editor. 32K

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NEW PRODUCTS NEW PRODUCTS NEW PRODUCT GAMES NEWS

METAL MEN OUT FOR YOUR BLOOD!

ROBOT

Robot is the blood sport of the future. You are the human prey in this cruel entertainment!

You are pumished around an arena by a killer robot. If the robot catches up with you you are viciously done to death by being jumped on by three tons of mechanical gladiator.

The robot is also armed with a plasma gun which will not kill you outright with the first shot but weakens and slows you down. If you suffer more than a few shots it's all over.

In order to avoid a messy death you must reach the robot's remote control box situated in the bottom right hand corner of the arena and switch it off.

If you manage to do this you can open the door of the arena and stride out a free man.

Just to make things a little more interesting for the spectators and a little more dangerous for you the arena is covered with several hidden mines which will blow you or the robot to bits if you put a foot in the wrong place.

Robot runs on a BBC Model B and is available from Bourne-mouth based Viking Software at £4.95.

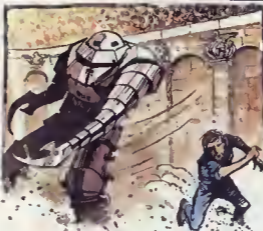
Also new from Viking this month for the BBC Model B is an action space game called Spaceflight: a breakout type game called Break-Up and a two player game called Skewish which will run on a Model A. The games cost £3.95.

PROWLING THE MEAN STREETS...

DEADLINE

Deadline is the latest crime solving mystery game to be imported from the US.

The package comes as a complete dossier of a crime committed on the 7th July 1962 when the wealthy industrialist Marshall



Rebner died of an overdose of Eubolan — an anti-depression drug he had been taking for some time. But was it suicide or was it murder?

That's for you to work out and you have only twelve hours to do it.

You get a brown folder containing all the documentary evidence. This includes the Coroner's report, a large black and white photograph of the scene of death with a white chalk line showing the position and outline of where the body had been found, a letter from Mr Marshall's Attorney, the Inspector's casebook complete with excerpts from an interview with Mrs Rebner, some fingerprints and an official memo, a lab report, and even samples of the tablets which were the cause of death.

Deadline became the number one best selling Apple game when it was released in the States in July.

The game is available in this country from Lancashire based Pete and Pam Computers. It runs on an Apple II and costs £39.25.

FAMOUS FIVE BREAK OUT FOR BBC

GALAXIANS

Five new arcade favourites have recently been launched by a new software house manufacturing exclusively for the BBC Model B.

A Galaxians cassette is an offer featuring four types of Galaxians swooping down individually in groups of two or three.

The game features six skill levels, with a hi-score recorder which ranks in numerical order the various high scores of the session.

Bonus bases are awarded for higher scores although the game gets increasingly difficult — just as in the arcade game.

Space Fighter is a hybrid combining some of the best features of the arcade classics Scramble and Defender.

A souped-up version of Space Invaders is offered with a few extra features thrown in to add interest. The flying saucers for example drop powerful bombs which wreak untold havoc on your laser bases.

Centipede is also offered featuring many features of the arcade version — mushrooms, snails, liles, spiders, and the centipede itself.

The games all run on the BBC Model B and cost £5.50 each or £5.50 each when you order two or more cassettes.

They are available from new Leeds-based firm, Superior Software.

HOT TIME IN THE OLD TOWN TONIGHT!

FIREBIRD

A firebird is flying across the city setting fire to buildings and incensing a denceless populace.

You play the part of a fireman trying to extinguish the flames and rescue the inhabitants of blazing tenements.

In order to rescue the unfortunate victims of the bird from another world you have to climb a ladder to where the trapped people are screaming for help.

The game comes on cartridge for the Atari 400 and 800 and retails at £29.95. It is available from Manchester-based Gemini Electronics.





**Your hands will sweat. Your heart
Your oxygen might run out. And you're still**



At seventy fathoms the only light comes from your Sonar, steadily tracking the advancing enemy fleet.

Suddenly they're above, dropping depth charges. You could dive. But how close is the sea bed? You could attack. But how many torpedos are left? And your oxygen. Isn't it dangerously low?



'Submarine Commander' is one of 21 challenging new home computer games from THORN EMI, for use with Atari 400/800 or Commodore VIC 20. Like our 'Jumbo Jet Pilot' it's more a real life simulator than a game.

But our programs aren't all work and no play. 'River Rescue', 'Kickback' and 'Soccer' are all-action games. 'Pool' and 'Darts' will suit armchair sportsmen.

And whilst budding Beethovens play the 'VIC Music Composer', would-be Chancellors can work on their budgets with 'Home Financial Management'. We also have educational puzzles for children that will puzzle adults at higher skill levels.

But there's one simple idea behind all our titles. They're designed for players who expect more of a challenge from a video game than creatures from outer-space can provide. Now are you sitting comfortably?



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Available from all branches of Laskys (Nationwide), Micro C at Currys and all other leading Computer software outlets.

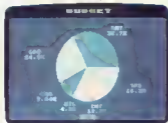
It will beat faster.
It's only sitting in an armchair.



Music Composer



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3.7 million reasons why the Atari Home Computer is something to see. The display screen used with our computers is composed of 192 horizontal lines, each containing 320 dots. Delivering colour and luminosity instructions to each dot for a second requires 37 million cycles...a lot of work for the normal 6502 processor.

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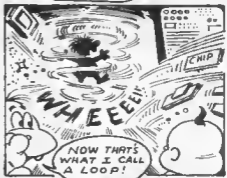
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8 programs for 16k ZX81

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PRINCESS OF KNAAL

An adventure game
BATTLE Strategy game for 1 to 4 players
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SECRET MESSAGES This message coding program is very info and if

MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable and its top speed is very fast
Cassette 3 costs £5.

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GUNFIGHT (machine code)



INVADERS (machine code)



FUNGALOID (machine code)

GALAXY INVADERS (machine code)

Fleets of swooping and diving alien craft

SLAKEBITE (machine code)

Eat the snake before it eats you. Variable speed (very fast at top speed)

LIFE (machine code)

A ZX81 version of the well known game

3D TIC-TAC-TOE (Basic)

Played on a 4x4x4 board, this is a game for the brain. It is very hard to beat the computer at it. 7 of the 8 games are in machine code because this is much faster than Basic. (Some of these games were previously available from J. Steadman)

Cassette 4 costs £5.

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Michael Orwin, 26 Brownlow Rd., Willesden, London NW10 9QL (mail order only please)

SPECTRUM SOFTWARE WANTED

GOING BY THE BOOK

I have described Ken Thompson's invention BELLE in previous articles. It (or she?) is a special-purpose machine built solely for playing chess, and won the third world Computer Chess Championship held at Lenz two years ago with a score of 4½.

The development speed of BELLE is as impressive as its subsequent results. The initial design was in February 1980 at which point its components (1,700 chips) were ordered. BELLE's first move was made in July 1980 and only two months later it won the world championship!

The machine generates a candidate move in just over one two-hundredth of a second and can examine 160,000 positions per second.

The opening "book" comprises 300,000 positions (compared with an estimated 200,000 positions in each volume of the Encyclopaedia of Chess Openings. The entire book is scanned in one and a half seconds.

BELLE's official rating is now around 2150, but improving its performance further is prohibitively difficult.

It is remarkable that the philosophy behind BELLE (fast and extensive searching of variations) is the exact opposite to that adopted by Mikhail Botvinnik, who as well as being a computer chess researcher for many years was three times world (human) champion.

His conference talk (see panel) on "Decision making and computers" stressed the importance of examining only a small number of positions at each turn — preferably only one — and to restrict the analysis for each move to approximately 50-60 well chosen — positions in all.

Only by this means, in Botvinnik's view, can master play be achieved. Botvinnik's program "Pioneer" has been a long time in development but may well be a major advance when it appears. Sadly it seems that there is virtually no other USSR

As well as a hobby and a game, computer chess has long served as a vehicle for serious research in computer science, especially the branch known as artificial intelligence which is largely concerned with the methods by which people solve problems requiring complex reasoning.

There has even been a series of academic conferences on the subject and the papers from the most recent one are now to appear in book form under the title *Advances in Computer Chess, 3* to be published by Pergamon Press and edited, as before, by Michael Clarke, a researcher at Queens Mary College, London.

The conference itself was held last Easter at Imperial College, London and attracted delegates from nine countries as well as speakers from no fewer than seven.

The first two conference talks were by Ivan Ustina, a Yugoslavian, and Don Beal from Queens Mary College who have been independently investigating the question "why are evaluations of positions based on deep analysis more reliable than 'static' ones made without any analysis?"

This seems obvious (and it is) but even so, recent chess playing programs are carrying out a vast amount of calculation (or nothing), but it is tantalizingly difficult to answer precisely. At least, an explanation (or, at least, a partial one) has been found and is given in the book.

Other theoretical papers at the conference dealt with different aspects of searching trees of variations, forms of automatic learning, long-range positional planning, mastering the "information" contained in a chess position, and psychological experiments on bulk people and machines.

Two of the most interesting papers at the conference were presented by Ken Thompson, of Bell Laboratories, and Mikhail Botvinnik who was making a rare visit to Britain from the USSR.

work on computer chess in progress at present.

The Kaissa program which won the world championship in 1974 has not been developed much since.

Although some of the conference papers are far from simple for the uninitiated to understand, *Advances in Computer Chess, 3* and the two earlier volumes, published by Edinburgh University Press, are the best available works for the serious student of the topic.

The next conference is due in 1984. Will computers have reached master level by then?

To conclude, here is a game played on the evening of the conference between Danny Kopec — a U.S. Master and former Scottish champion — and BCP, a good example of a well-developed and relatively strong program.

Danny Kopec was playing BCP and an early version of BELLE — 30 times slower than the current one — simultaneously.

BCP (White) versus D. Kopec (Black)

1. P-K4, P-K3; 2. P-Q4, P-QB4;
- The "Franco-Sicilian" defence. Black's strategic aim is "to confuse White" and he succeeds. BCP is now out of the book
3. N-KB3, P-P5; 4. Q-P
- An attempt at originality.
4. N-QB3; 5. Q-Q3, B-B4; 6. N-B3, N-B3; 7. B-KB4, Q-N3; 8. N-Q1, P-Q4, 9. P-P4, N-P4; 10. B-K3, N-P4, 11. P-P4, N-B4. Black is now well ahead on development.
12. B-K2, N-N5; 13. Q-B3? 0-0; (Fig. 1)
- White is lost, Black threatens 14... N-QRP immediately. White's Queen Bishop Pawn is vulnerable and a Knight move to Q4 is also dangerous
14. N-K5, B-R5; 15. B-Q3,
- White's only possible counterplay is 15. N-QB4
- 15... N-Q4;
- Overlooking 15... N-QB4ch.
16. Q-B4, Q-R4ch; 17. P-B3, Q-R-B1;
18. Q-R4, P-B4;
- A typical computer game. White is totally lost but keeps finding counterplay
19. N-B4, Q-B2; 20. P-QN3, B-K1; 21. P-R4, N-KP;
22. N(B4) × N, B × N. 23. N × B, Q × Bch; 24. K-K2, Q-N7ch;
25. N-B2? R × Nch; 26. B × R, Q × Bch; 27. K-KB1, B-B3,
28. Q-N5, P-KB5; 29. R-K1, P-B5
- and Don Beal resigned for his program.



Fig. 1 a b c d e f g h

TV GAMES CENTRES TV GAMES CENTRES TV GAMES VIDEO SCREEN

E.T. MEETS THE F.B.I.

All I want to do is get home. That's poor old ET's lament in the latest Steven Spielberg block buster in which the friendly alien from outer space does his best to get back to his family and friends.

Trouble is every time ET tries to do just that: those 'Earthling Aliens' conspire to stop him.

The men from the FBI tries to lock him up for the protection of the good citizens of the US.

The scientist wants to get him back to his laboratory to carry out all sorts of gruesome experiments.

ET soon finds that the only person he can trust on the inhospitable planet Earth is schoolboy Elliot.

Now you can become ET's friend and help him get home in this latest game from Atari for the VCS.

The idea of the game is to find the three pieces of E.T. interplanetary telephone and then call up his ship to come and rescue him.

Whilst conducting your search, manoeuvring ET around the screen using the joystick, you can also pick up pieces of candy which appear periodically in the centre of the screen.

As well as eating you extra points these pieces of candy are also vital in helping you locate the third section of the telephone.

The game is controlled by nine power zone symbols which are constantly changing on and

ET.

which you must keep a sharp eye as they dictate what you can and cannot do at any given stage in the game.

The game has three difficulty levels. The simplest of these features just ET and his little friend Elliot searching for the various bits of the telephone.

Game two introduces the government agent who is trying to arrest ET and chases him.

For really skilled players level three introduces another badha to deal with in the shape of a scientist who will haul ET back to his laboratory.

ET will be in the shops before Christmas to coincide with the him going on general release. It costs £29.95.

SECRETS OF SYSTEM X

The long awaited successor to Atari's successful VCS machine is about to be released in the US.

The 5200 will be in the shops in the US, this Christmas at around the £150 mark. Dubbed System X when prototypes were shown to journalists the machine has 48K of computer memory enabling it to produce 'state of the art' graphics.

The aim was to produce video games to be played on a domestic TV set of the same high quality as the coin operated games of the arcades, and according to our sources, the first wave of games, which includes Pacman and Centipede, do have the line graphic detail one associates with the pay-per-play dances.

Before Atari owners start rushing out to the shops to enquire about this new machine there are two drawbacks that must be mentioned first. Most importantly Atari have so far said nothing about a UK launch date for the 5200. Indeed an Atari spokesman told C&VG: 'We don't want to talk about that yet'.

Secondly the present range of Atari VCS games will not be compatible with the new system. It has been rumoured in the U.S. that an adaptor which would enable VCS games to be played on the 5200 is also to be produced



WHO'S NOT A PRETTY BOY THEN!

SPACE VULTURES

Space Vultures are a vicious breed of bird-like aliens who can fly through space without the aid of space ship. They will attack any old planet that takes their fancy on their strange intergalactic migration.

Nobody seems to know where they are going, or for what purpose, but then it does not really matter to you — the lone pilot of the sole remaining planetary Defender Ship.

Your duty is clear: Shoot down the aliens before they shoot you and colonise your planet for their evil bird-like overlords.

The vultures attack in groups of three, hovering around the screen and then homing in on your space ship.

You are armed with an energy shield which will protect you for a few seconds, enabling you to survive a head-on collision with the aliens and shing off their laser line.

If you survive the first wave of Vultures you are then challenged by the super birds who are several times the size of their predecessors and who attack in waves of three.

These superior adversaries take more than one direct hit to finish off. They swoop down straight towards your ship born barding you with missiles. You will need to shoot fast and accurately to down them before they down you.

One drawback that Defender Ship pilots very quickly have to come to terms with is the slowness of the ship's missiles. They take very awkwardly sideways.

Despite this the Vultures are still pretty easy to deal with. This particular Defender Ship pilot managed to shoot down wave after wave of them on his second go.

Space Vultures is the latest game for the new Hamamex HM6 2650. The game is available from Hamamex stockists at approximately £20.

ATARI 5200

but this has so far not been confirmed.

If there is some uncertainty about when Atari will launch their new machine in the U.K. there is no doubt about the debut of another exciting video games system from America — the Colecovision.

The graphics are not only more detailed than conventional systems but they are also capable of producing more on-screen movement, greatly enhancing the playability of the popular space-battle genre of video games.

Coleco have insured the system against obsolescence in the fast moving video games market by making it capable of being up dated with a planned programme of add-ons. The first of these add-ons will be an adaptor which will enable any existing cartridge produced for the VCS to be played on the Colecovision.

The machine will be launched with an exciting range of games. Arcade smash hits like Donkey Kong (with the manic gorilla, and captured starlet), Zaxxon and Gorf have both been converted.

The Colecovision is expected to be in the shops by next April but no news on price yet.



S CENTRES TV GAMES CENTRES TV GAMES CENTRES VIDEO SCREEN

BRIGHT NEW YEAR FOR VIDEO FANS

Every other TV commercial these days seems to be advertising either video games centres or extra cartridges to go with them.

One spin off from this hotting up of competition is that prices in the high street shops are beginning to fall.

The Interton VC400 can now be snapped up for less than £50 which includes a free Space Invaders cartridge. The price of additional cartridges for this machine are also down in price.

It is as well to issue a word of warning about this machine however. Hasinmax have recently introduced a new machine to replace the Interton — the HMB 2650. There will therefore be no new games for the Interton once current supplies have sold out.

GAMES CENTRES

Not that only machines which are being phased out are falling in price. Phillips have recently announced that they will be chopping £30 off the price of their G7000 to help them compete with Atari in the Christmas shopping spree. New price £79.

Mattel is tight lipped on the subject of price cuts to their Intellivision machine which is now selling for £159. It is unlikely that they will be able to maintain this price for too much longer. Many of the dealers have already felt it necessary to top £20 off this price. Even at £139 the machine is competing not only with other TV games-centres but with half a dozen micro-

computers many with superior graphics and a wider and cheaper range of games available.

Even Atari, who currently heads the field with sales of their VCS, will find it difficult to resist a price cut in the new year as the prices of micro computers looks set to tumble.

The price of cartridges too is likely to come down more in line with prices in the US where games cartridges are roughly a third of the price they sell for in the UK.

So although it is not an option open to Fether Christmas the wise buyer may do better by saving his money until the Spring.

DOWN THE CORRIDOR OF DANGER

You are a secret agent on a mission to infiltrate a top secret fortress.

Armed with a powerful laser gun you can shoot the mechanical guards of the fortress who are chasing you. You can also duck down by pulling back the joystick to crouch beneath the guards' lasers.

The screen shows five corridors, one on top of the other, with six connecting lifts.

The idea of the game is to get your little man to the highest corridor and then safely back down again.

Precision timing is needed to judge just the right split second

INFILTRATE

to jump on one of the lifts which pump up and down automatically like pistons in a steam engine.

Once on a lift you have to watch carefully for the positions of the mechanical guards as a blast of laser fire is their usual greeting to anything unexpected emerging from a different floor level.

Infiltrate can be played by one or two players and is the latest addition to the Apollo range of games for the Atari VCS.

Also new from Apollo for the pre-Christmas shopping rush is a

nail-biting traffic control game called Final Approach.

This is your chance to suffer the tension in a simulation of one of the world's most high press and jobs.

Planes are taking off and landing at an international airport. It is your job to see that the incoming traffic gets down safely without colliding with countless outgoing lights. Sounds easy? Just you give it a try. And remember many of the world's most serious air disasters have been traced back to air traffic control blunders and that the average air traffic controller retires with an ulcer before the age of 40!

Also new this month on the Apollo label is a slightly less serious game called Wabbit.

You are an honest hard-working farmer trying to protect your crops from a family of thieving rabbits who live in a series of burrows in your carrot field.

Every time the big ears pop up from one of the holes you throw one of your rotten eggs at them in an attempt to sink them out of their honeycombed hide out.

The Apollo range of games are imported into this country from the US by Vulcan Electronics of London. They are currently in the shops at £24.95.



Illustrations: Terry Rogers

MACHINE	NAME	MANUFACTURER
1. Intellivision	Dungeons and Dragons	Mattel
2. Intellivision	Sub Nurd	Mattel
3. Atari	Defender	Atari
4. Intellivision	Night Stalker	Mattel
5. Atari	Spartan	Activision
6. Intellivision	Lock 'n' Chase	Mattel
7. Atari	Barzark	Atari
8. Atari	PacMan	Mattel
9. Intellivision	Utopia	Parker
10. Atari	Frogger	

The above top ten represents the sales of cartridges during the month of October.

The dominance of Mattel games is being due to a backlog of delayed releases in that month. People bought a number of Mattel titles they had been waiting for some time.

The retailers are expecting the November chart to show a completely changed picture. Watch out for next month's top ten. Will your favourite be in the charts?

PENGO IS REALLY COOL!

It is possible to judge your addiction to an arcade game by how far you will travel to play it. For one more game of Pengo I would willingly travel to the Antarctic wastes in which it is set.

Four lucky members of the C&VG team have so far tried out this initial of coin-operated video games and their verdict is unanimous: ... Pengo is the C&VG tip for 1983.

First, read-on and then go and make your local arcade owner to get hold of a Pengo machine.

PENGO

That is the essence of the game, Pengo must wipe out each swarm of sno-bees before they can run him to ground.

Each screenful of sno-bees consists of some which become instantly active and others disguised as ice blocks. These can be poked to death by Pengo before they "wake up".

Unlike the Pacman ghosts, sno-bees are somewhat haphazard in their pursuit although one will occasionally give dogged chase to Pengo.

But while not unduly aggressive, these cute little villains can usually spot a weeping penguin a mile off and will try to approach on the wrong side of the ice block, thus robbing Pengo of his ammunition.

They are helped in this by their ability to chisel through the ice-blocks and Pengo shares the ability when he needs to get out of a tight corner.

There is a lot more to this game, like making the sno-bees dizzy and scoring big bonuses by squashing two with one block or using the indestructible blocks.

Pengo is a game apart, with



wonderful graphics, delightful characterisation, plenty of scope to work out your own tactics and a catchy melody.

But if there's one overriding reason why Pengo will take off, it's down to the feeling of satisfaction you get when an ice-block picks up speed and knocks all the wud out of a surprised sno-bee!

THE SUICIDAL STOCKBROKER

WALL STREET CRASH

The great Wall Street crash is happening all over again.

As first chief as your job to catch the suicidal stock brokers as they try to end it all in one final desperate leap.

Once safely pouched in a safety blanket the danger is not over as they must be bounced into a waiting ambulance. A good player will manage it in two bounces, a beginner will well see his stockbroker bouncing off screen or just straight up again.

And the Dow Jones Index is falling all the time. Each broker who reaches an ambulance helps light up the bank and so will enable you to move onto the next stage of the game.

This is a long maze where money bags have been hidden. These must be collected and deposited in a safe. Tanks chase you through the maze.

The action continues in these modes alternatively with more tanks and more brokers being added. By the time you reach three suicidal stock marketeers, a helicopter has appeared and it is possible to achieve a bonus by shooting a saved broker skywards into it.

BURGERS HAVE YOU IN A PICKLE

Burger time is the fast food game to keep a budding chef on his toes.

Pictorial the scene, the eggs sausages and pickles are revolting in the kitchen.

You take the part of a chef, whose only hope is to leap your edible enemies in the burgers you are busy making.

A series of burger bridges are constructed among the platforms and ladders which make up your kitchen. Every time you run across a burger, piece of bun, cheese, tomato or lettuce, it drops closer to the dish the complete burger must end up on.

As you run across the piece of cheese, for example, it drops down a level, sending whatever lay below it, down too. Gradually a complete burger is built up, but a good player will add eggs, sausages and pickles to the burger by catching these items of food between layers.

BURGER TIME

This is done by running across a piece of burger when closely followed by an enemy.

When things get too hot for you, a quick sprinkle of pepper from your pot will stop the enemy.

French fries and ice-cream cones will add to the pepper you have left in your container.

Like Doukey Kong, the game is divided into different screens, so that once you have completed the burgers on one screen, a more difficult one will appear.

Burger Time has a charm all its own and enjoys the benefits of only having a joystick and one button control. The idea behind it is simple, its implementation more difficult than you would think possible.



ACTION

ON THE ROAD TO RUIN ON THE MOON

MOON PATROL

The moon's surface is an inhospitable place, pitted with craters and also boasting an atmosphere heavy with aliens.

In Moon Patrol a moon buggy is your responsibility as it traverses a lunar landscape across the screen.

You are armed with a fire button and a jump stick to overcome most of the hazards that come your way.

The aliens hovering above your craft are the main source of danger in this game.

By pushing your fire button you can launch a missile skywards to try and bring them down.

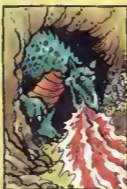
But take care to avoid the bombs they are dropping moonwards to bring about your destruction.

Their bombs may also leave dangerous pits in the moon surface and these have to be noted and duly jumped.

The alien attacks take on three forms, there are obstacles across the surface which have to be blown up. Land mines, erupting volcanoes and low flying planes add to the tension.

If you survive the beginner's course there is a champion course waiting to challenge you.

Moon Patrol is a simple game with easy to tackle controls and an obvious game objective, but it is not among the best of the recent batch.



SOMETHING NASTY IN THE GARDEN

DIG-DUG TIPS

The Dig Dug score clock turns over at 999,999 but that doesn't be the limit for a dedicated player.

Although this score seems beyond belief to a beginner, it is really just a matter of knowing the short cuts.

Beginners tunnel their way up to a monster (either a fire-breathing Fygat or a less dangerous Poeka), fire their pump gun, pump the creature to death and then move onto the next victim.

Using this technique it is possible to clear round after round but it has several disadvantages, it stops being effective at the higher rounds, it is very time consuming, it generates far less points as the fruit is not always recovered.

A better technique is to find your way beneath a rock, wait for some monsters, squash them, tunnel through to the next rock, squash some more, grab the fruit and then finish off the monsters. Try and reach the rock before the ringing noise sounds as this releases the monsters.

Should monsters block you off from the next rock (there is a technique for killing them).

After dropping the first rock tunnel yourself close to the main tunnel but not actually breaking through into it. Two millimetres is enough to use your pump on passing monsters who cannot

get your man. Always approach the tunnel horizontally as more points accrue from monsters tickled this way. When only two monsters remain move to the next rock, use it, thus making the fruit appear, grab it and finish off the final monster.

Fygats killed horizontally are worth double points and another way to bump up the points is to pump monsters in the lower areas of the screen.

It is divided into four horizontal layers. Points scored for a monster depend on which area he is finished off in. For example, a Poeka is worth 500 points if he is killed in the bottom layer.

When pumping a monster, push forwards then as this will irritate them faster.

A tip for rock tunnelling is to leave a notch below the horizontal entrance to the vertical tunnel. This notch will ensure that no monsters escape.

Nonstop Dig-Dug champion Tooba Zaidi, who compiled these tips for us, offers some other information for top players: most rounds that can be displayed are 99 if you squash all eight monsters a 15,000 point bonus is achieved and after the 32nd round any successful pattern you devise will work for the next 50 rounds at least.

THE VIDEO WIZARDS

The latest casualty of improving arcade scores is Atari's Centipede. These players have now come forward to reach 999,999 and I gather that it is possible to go well over the clock on this machine — and so it seems time to close this down.

Only one contender for tuning



Grab your bicycle clips and head for your nearest arcade. Bally's BMX is heading your way! This latest pinball from the American giant is based on the new cycling craze, bicycle motocross.

BMX continues Bally's return to the table that requires quite a lot of skill to master. It BMX features two levels and colour-coded targets — like the recently released Spectrum. There's also a mysterious magnetic device on the top level.

A novel feature of this novel machine are the devices which save a ball which finds its way down the chute. There are two additional buttons alongside those which control the flippers and these work two "shields" which catch the lost ball and send it back into play — but you can only use them just so often!

the clock over at Dig Dug though Tooba Zaidi, who wrote the tips is our highest scorer here. Tooba also claims top spot on the Tempest machine. Still, awaiting scores on Space Dungeon and Robotron.

Illustrations: Terry Rogers



TEMPEST
945,461
Tooba Zaidi
SCRAMBLE
912,160
Andrew Winup
GORF
886,430
Gary Miller
FROGGER
116,150
Richard George
DIG-DUG
999,990
Tooba Zaidi
DONKEY-KONG
428,300
John Bull

QIX
263,820
Sarajit Singh
CRUSH ROLLER
471,530
Alan Dowler
AMIDAR
74,330
R. J. Arundale
HYPERBALL
1,448,060
Nick Sirkings
PHEONIX
405,630
John Danvers
PACMAN
1,050,900
Tim Haywood

Perhaps it's just the rhythmic "plink" of the sonar bouncing off the enemy hull, or maybe that tomblike silence which adds to the tension between depth charge blasts but submarine films always have that much more atmosphere than any other war movies.

Sub Hunter lets you partake in the thrill of an under-

water naval battle ... but luckily for the claustrophobic, your role is acted out above the Briny.

The submarines may be running silent and deep but your mission is to seek them out and blow 'em up.

Your helicopter hovers above the waves, while the enemy uses them to dodge

and hide from your bombs.

The submarines are not alone though.

A fleet of destroyers is on hand to give covering fire and try to blast you out of the sky.

Points are scored for successful bombing of destroyers and for the destruction of the enemy subs.

RUNS ON AN ATARI 400 IN 16K

SUBMARINE HUNTER

BY HUGH DENHOLM



```

10 GOTO 8800
2098 REM **JOYSTICK CONTROL **
2099 REM ** FOR HELICOPTER **
2100 S=STICK(0)
2102 GOSUB 6000
2103 GOSUB 7000
2104 IF STRIG(0)=0 THEN 5000
2105 IF S=15 THEN 2100
2110 T=0:D=0
2120 T=(S=5)+(S=7)+(S=6)-(S=10)-(S=11)-(S=9)
2130 D=(S=5)+(S=9)+(S=13)-(S=6)-(S=14)-(S=10)
2140 IF T=0 THEN 2170
2142 IF T=1 THEN 2150
2145 GOTO 2160
2150 X=X+4:POKE 53251,X:IF X>=250 THEN X=250
2155 GOTO 2170
2160 X=X-3:POKE 53251,X:IF X<8 THEN X=8
2170 IF D=0 THEN 2100
2172 IF D=1 THEN 2179
2175 GOTO 2199
2179 IF Y=40 THEN 2100
2180 FOR I=7 TO 0 STEP -1:POKE PMBASE+B96+Y+I,PEEK(PMBASE+B95+Y+I):NEXT I
2190 Y=Y+1
2195 GOTO 2100
2199 IF Y=4 THEN 2100
2200 FOR I=0 TO 7:POKE PMBASE+B95+Y+1,PEEK(PMBASE+B96+Y+1):NEXT I
2210 Y=Y-1
2220 GOTO 2100
4999 REM **HELICOPTER MISSILE CONTROL**
5000 R=Y+5:SS=X+3:POKE PMBASE+384+R,192:POKE 53255,SS
5005 MSL=MSL-1:GOSUB 7800
5010 R=R+1:M=PEEK(53251)
5015 GOSUB 6000:GOSUB 7000
5020 IF R>=95 OR SS<5 OR SS>226 OR M=2 OR M=3 OR PEEK(53279)=3 THEN GOSUB 7600:B
GOTO 2105
5030 POKE PMBASE+383+R,0:POKE PMBASE+384+R,192:SOUND 3,50+(Y+R)/2,10,B
5040 IF STICK(0)=7 THEN SS=SS+1:POKE 53255,SS
5050 IF STICK(0)=11 THEN SS=SS-1:POKE 53255,SS
5060 POKE 53255,SS
5070 GOTO 5010
5999 REM **SUBMARINE CONTROL**
6000 E=E+1
6010 J=PEEK(53259):IF E<1 THEN E=0
6020 IF E>185 THEN GOTO 6100
6030 POKE 53249,E:IF J=10 THEN HITS=HITS+1:GOSUB 7600:GOTO 6060
6040 K=K+1:IF K>=20-MSL THEN POKE 623,2:FOR A=1 TO 10:NEXT A:POKE 623,4:K=0
6050 RETURN
6060 FOR A=250 TO 100 STEP -1:SOUND 0,200,B,A/17:NEXT A:SOUND 0,0,0,0:E=0
6070 GOSUB 7800
6080 RETURN
6100 POKE 623,2:FOR A=1 TO 50:POKE 705,14:SOUND 2,50,10,B:SOUND 0,75,10,B:NEXT A
6110 SOUND 2,0,0,0:SOUND 0,0,0,0:POKE 705,88:E=0:HOME=HOME+1:GOSUB 7800:RETURN
6999 REM **DESTROYER MOVEMENT**
7000 IF J=12 THEN M=2:DST=DST+1:GOSUB 7350:GOSUB 7600:GOTO 7030
7010 Q=Q-1:IF Q=0 THEN D=180
7012 COLOR 0:XX=INT(RND(0)*130):PLOT XX,59:COLOR 3:XX=INT(RND(0)*130):PLOT XX,59
7015 GOTO 7200
7020 POKE 53250,0:RETURN
7030 FOR R=71 TO 75
7040 SOUND 0,220,12,6:FOR A=5 TO 0 STEP -1:POKE PMBASE+768+R+A,PEEK(PMBASE+767+R+A):NEXT A
7050 FOR CT=1 TO 50:NEXT CT
7060 NEXT R
7070 D=180:POKE 53250,D:SOUND 0,0,0,0
7080 FOR R=75 TO 71 STEP -1
7090 FOR A=0 TO 6:POKE PMBASE+767+R+A,PEEK(PMBASE+768+R+A):NEXT A
7100 NEXT R
7105 GOSUB 7800
7110 RETURN
7199 REM **DESTROYER MISSILES**
7200 IF FIRE=1 THEN 7240

```

STOP HERE!

ATARI FOR ATARI GAMES ATARI

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K-Razy Antics	ROM	8K	27.50	Tigers In the Snow	D/C	48/32K	27.50
K-Star Patrol	ROM	8K	27.50	Cosmic Balance	D	48K	27.50
K-Razy Kritters	ROM	8K	27.50	Sea Dragon	D/C	24/16K	22.50
K-Razy Antics	ROM	8K	27.50	Stratos	D/C	24/16K	22.50
Firebird	ROM	8K	27.50	Space Challenge	D/C	24/16K	19.95
Embargo	ROM	8K	27.50	King Arthur's Heir	D	32K	19.50
Baja Buggies	D/C	24/16K	19.95	32K RAM board 400/800 machines			59.50
Crypts of the Undead	D	32K	19.50	Fast Chip	ROM		27.95
Escape from Vulcans Isle	D	32K	19.50	Atari 400 keyboard (in-home)			79.95
Protector II	D/C	32K	22.95				

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ST. JOHNS, WORCESTER WE2 5EY

SOFT DEAL

Please send me the following items:

1
2
3
4
5
6

Despatch to:

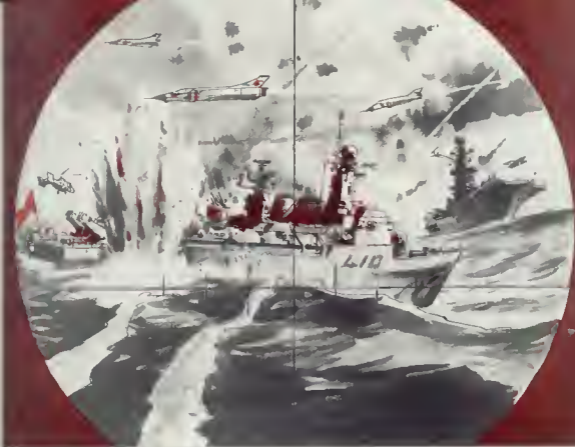
Name

Address

I enclose my cheque for £

Add 60p post/packing for each item

Please debit my Access card no.



```

7210 IF D>150 OR Q<40 THEN 7020
7220 B0=RND(0)*100:IF B0>95 THEN FIRE=1:GOTO 7240
7230 GOTO 7020
7240 IF START=1 THEN 7260
7250 START=1:U=Q:V=68
7260 POKE PMBASE+384+V,0
7270 IF X>U THEN U=U+RND(0)
7280 IF X<U THEN U=U-1-(U-X)/80
7290 V=V-1:IF V+10<Y OR V=0 OR U=0 OR U=255 THEN GOSUB 7350
7300 HIT=PEEK(53258):IF HIT>0 THEN GOSUB 7350:GOSUB 7500
7305 IF START=0 THEN GOTO 7020
7307 SOUND 3,V,10,7
7310 POKE PMBASE+384+V,48:POKE 53254,U
7320 GOTO 7020
7349 REM **DESTROYER MISSILE END**
7350 FIRE=0:START=0:POKE 53254,0:POKE PMBASE+384+V,0:SOUND 3,0,0,0
7355 POKE 77,0
7360 GOTO 7020
7499 REM **CLEAR HELICOPTER**
7500 GOSUB 7600:M=3
7505 FOR A=1 TO 50:POKE 707,0:POKE 707,14:SOUND 0,200,8,15:NEXT A
7510 SOUND 0,0,0,0:POKE 707,54:X=45:POKE 53251,X
7520 MSL=20:HEL=HEL-1:IF HEL=0 THEN GOSUB 7350:GOSUB 7800:GOTO 8000
7530 GOSUB 7800
7599 REM **HELICOPTER MISSILE END**
7600 SOUND 3,0,0,0:POKE 53278,0:POKE 53255,0:POKE PMBASE+383+R,0:R=95
7620 IF MSL=0 THEN 7510
7630 RETURN
7799 REM **PRINT SCORE**
7800 POKE 752,1
7810 PTS=(HITS*250)-(HOME*50)+(DST*100)

```

5th
ZX MICROFAIR
DECEMBER 1985
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An investment at £10 (48K Spectrum) £8 (16K ZX81)



```

7850 ? "SUBS DESTROYED "J: ? HITS: ? " HELICOPTERS "I: ? HEL
7855 ? "SUBS HOME "I: ? HOME: ? " MISSILES "I: ? MSL
7860 ? "DESTROYERS SUNK "I: ? OST: ? " POINTS "I: ? PTS
7870 RETURN
8000 RESTORE
8002 POKE 53277,0:POKE 53248,0:POKE 53249,0:POKE 53250,0:POKE 53251,0
8005 GRAPHICS 2+16
8010 ? #6: ? "I: ? #6: ? "I: ? #6: ? " THE END "I: ? #6: ? "
8015 FOR A=1 TO 200:NEXT A:GRAPHICS 2+16
8020 ? #6: ? "YOU SANK "I: ? #6: ? "I: ? #6: ? " DESTROYERS"
8030 ? #6: ? "YOU BLEW UP "I: ? #6: ? "I: ? #6: ? " SUBMARINES"
8040 ? #6: ? "AND SCORED "I: ? #6: ? "I: ? #6: ? " POINTS"
8050 ? #6: ? "
8060 IF PTS<2000 THEN 8070
8061 IF PTS<8000 THEN 8080
8062 IF PTS<15000 THEN 8090
8063 ? #6: ? "perfect" well done "I: ? #6: ? "
8070 ? #6: ? "perhaps you had the joystick upside down" :GOTO 8075
8080 ? #6: ? "not bad! try again" :GOTO 8095
8090 ? #6: ? " very good"
8095 ? #6: ? "PRESS START TO PLAY AGAIN"
8100 IF PEEK(53279)<>6 THEN 8100
8110 GOTO 10
8800 GRAPHICS 2+16:POSITION 0,4: ? #6: ? " submarine hunter" :POSITION 0,6: ? #6: ? "
BY HUGH DENHOLM"
8810 POSITION 0,10: ? #6: ? "press start to begin"
8850 IF PEEK(53279)<>6 THEN 8850
8900 REM **ESTABLISH BACKGROUND**
8901 REM **AND PLAYERS**
8905 GRAPHICS 7
8910 COLOR 1:SETCOLOR 0,0,15:SETCOLOR 4,9,10
8920 PLOT 35,10:DRAWTO 38,10:PLOT 33,11:DRAWTO 40,11:PLOT 32,12:DRAWTO 42,12
8930 PLOT 30,13:DRAWTO 43,13:PLOT 29,14:DRAWTO 45,14:PLOT 27,15:DRAWTO 48,15
8935 PLOT 28,16:DRAWTO 47,16:PLOT 29,17:DRAWTO 45,17:PLOT 31,18:DRAWTO 44,18
8940 PLOT 33,19:DRAWTO 42,19:PLOT 34,20:DRAWTO 41,20:PLOT 36,21:DRAWTO 40,21
8945 PLOT 97,2:DRAWTO 101,2:PLOT 95,3:DRAWTO 102,3:PLOT 93,4:DRAWTO 103,4:PLOT 9
2,5:DRAWTO 104,5
8950 PLOT 91,6:DRAWTO 107,6:PLOT 90,7:DRAWTO 111,7:PLOT 90,8:DRAWTO 113,8:PLOT 8
9,9:DRAWTO 114,9
8960 PLOT 90,10:DRAWTO 115,10:PLOT 90,11:DRAWTO 115,11:PLOT 91,12:DRAWTO 114,12:
PLOT 92,13:DRAWTO 113,13
8970 PLOT 93,14:DRAWTO 112,14:PLOT 93,15:DRAWTO 111,15:PLOT 95,16:DRAWTO 109,16:
PLOT 97,17:DRAWTO 107,17
8975 PLOT 72,20:DRAWTO 75,20:PLOT 70,21:DRAWTO 76,21:PLOT 68,22:DRAWTO 78,22:PLOT
T 67,23:DRAWTO 79,23
8980 PLOT 68,24:DRAWTO 78,24:PLOT 69,25:DRAWTO 76,25:PLOT 71,26:DRAWTO 75,26:PLOT
T 72,27:DRAWTO 74,27
9010 COLOR 3:SETCOLOR 2,8,4
9020 FOR Y=60 TO 79:PLOT 0,Y:DRAWTO 159,Y:NEXT Y
9030 FOR CT=1 TO 80:XX=INT(RND(0)*160):PLOT XX,59:NEXT CT
9035 COLOR 2:SETCOLOR 1,12,10:FOR YY=58 TO 70:PLOT 130,YY:DRAWTO 159,YY:NEXT YY
9037 FOR YY=71 TO 79:PLOT 157,YY:DRAWTO 159,YY:NEXT YY:PLOT 0,79:DRAWTO 159,79
9040 YY=57:FOR XX=130 TO 159:L=RND(0)*2:YY=YY-L:PLOT XX,57:DRAWTO XX,YY:NEXT XX
9042 HEL=3:MSL=20:HITS=0:HOME=0:OST=0
9045 POKE 752,1: ? " PLEASE WAIT WHILE I BUILD YOUR" : ? " HELICOPTER"
9050 POKE 623,4
9055 POKE 559,46:POKE 707,52
9060 X=47:Y=5:E=0:Q=180
9070 A=PEEK(106)-24:POKE 54279,A:PMBASE=256*A
9080 FOR B=PMBASE+384 TO PMBASE+1024:POKE 8,0:NEXT B:POKE 53277,3
9090 FOR B=PMBASE+896+Y TO PMBASE+902+Y:READ A:POKE B,A:NEXT B
9100 DATA 127,8,190,251,62,36,126
9110 POKE 53251,X
9120 FOR B=PMBASE+730 TO PMBASE+734:READ A:POKE B,A:NEXT B
9130 DATA 8,8,126,127,62
9140 POKE 53257,1:POKE 705,88:POKE 53249,E
9150 FOR B=PMBASE+839 TO PMBASE+843:READ A:POKE B,A:NEXT B
9160 DATA 16,58,255,127,62
9170 POKE 53258,1:POKE 53248,Q:POKE 706,2
9175 GOSUB 7800
9180 GOTO 2100

```

Some nasty alien dam-busters are out to knock a big hole in your local dam and only you can stop them! The alien ships — code named Nibblers — can only be stopped by a well placed bomb from your fighter. If you miss the Nibbler will blast a bit out of the dam weakening it. This is a game for one player adapted from Paul Jay's prizewinning program which won him the Com-

puter and Video Games Program of the Year competition

The Nibbler appears on the right hand side of the screen and moves across towards the dam. To stop the Nibbler and launch your ship you hit the space bar. When you are directly above the nasty alien you press the space bar again to bomb.

If the computer has been expanded and so has extra memory you

could use the user-definable graphics capability of the Vic to improve the game. If so then the following routine should be added at the end of the program, and line 3 changed to:

```
3 PRINT CHR$(14):
GOSUB 1000
1000 FOR I = 0 TO 1024
1010 POKE 5120 + I,
PEEK (32768 + I):
NEXT I
1020 FOR I = 0 TO 1024
READ A
```

```
1030 IF A = 1 THEN 1070
1040 POKE 6144 + I, A
NEXT
1050 DATA 56, 124, 230,
3, 3, 230, 124, 56
1060 DATA 24, 60, 102,
231, 166, 24, 35, 68
1070 POKE 36869, 253:
POKE 36866, PEEK
(36866) OR 128
```

```
1080 RETURN
```

If the above program is used then the pokes and peeks will have to be changed — 60 to 128 and 62 to 129

NIBBLERS



```

1 REMCONCRT
2 PRINT"Q":0=-32
3 PRINTCHR$(14)
4 POKE36879,237:POKE36878,15
5 FORM=7680T07701:POKEM,224:HEXT
6 FORM=7702T08164STEP22:POKEM,224:POKEH+21,224:HEXT
7 FORM=8164T08165:POKEH,224:HEXT
8 FORB=1T05
9 POKE36875,200:POKE36876,0
10 FORL=1T0500:HEXT
15 PRINT"#####":FORP=1T0200:HEXT
20 PRINT",":FORP=1T0200:HEXT
25 PRINT"!":FORP=1T0200:HEXT
30 PRINT" ":FORP=1T0200:HEXT
40 PRINT"~":FORP=1T0200:HEXT
50 PRINT"~":FORP=1T0200:HEXT
65 PRINT"#####":FORP=1T0200:HEXT
70 HEHT
69 POKE36879,25:POKE36878,0
78 PRINT"THE OBJECT OF THE GAME"
80 PRINT"IS TO HIT THE BOBLERS"
90 PRINT"BEFORE THEY DESTROY":PRINT
100 PRINT"THE DAM."(PRINT
110 PRINT"THE CONTROLS ARE:":PRINT
120 PRINT"SPACE TO STOP 'BOBLER'":PRINT"AND LAUNCH YOUR SHIP.":PRINT
130 PRINT"AND SPACE AGAIN TO":PRINT"PRINT'DROP YOUR BOMB, IF YOU "
131 PRINT"MISS YOU LOSE A POINT.":PRINT
140 PRINT"IT A KEY TO CONTINUE"
150 GETAF:IFAF=" "THEN150
151 POKE36879,191
155 PRINT"Q"
156 FORM=8164T08165:POKEH,224:POKEH+36720,5:HEXT
159 REH#####*CONSTRUCT DAN*
165 V=12:POKE76570,15
170 A=0
180 FORB=7724T08164STEP22
185 POKE36877,220:FORP=1T05:HEXT:POKE36877,0
190 POKEH+8,224:POKEH+B+36720,6
200 NEXTB
210 A=A+1:IFAC2THEN180
220 FORA=0T01
230 FORB=7726T08167STEP22
235 POKE36877,220:FORP=1T05:HEXT:POKE36877,0
240 POKEH+B,102:POKEH+B+36720,0
250 NEXTB
260 HEXTA
261 PRINT"SCORE":S
262 T1$="000000"
263 PRINT"#####HIGH"0
264 PEM#####*NI8BLER*+++
270 A=INT(RND(1)+19)+1:D=7744:B$="":F=0
280 FORP=1T0A:D=D+22:HEXT
290 IF PEEK(D)>2182THENR=0:GOTO380

```

RUNS ON AN UNEXPANDED VIC-20

ADAPTED FROM C&V's

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(DESIGNER — JEFF MINTER)

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Your spaceship must attack the descending aliens and blast their evil intent. Fly your blaster fighter over the Andes mountain range and protect your llama from kidnapping by hostile UFOs. Features 5 kinds of UFO, controls include up, down, reverse, fire, thrust and smart bombs. Entry in machine code. Requires BK expansion and joystick. £9.90 + 50p P&P

TRAXX M-C (BK + EXPANSION)

As seen at the Commodore show and reviewed by the Daily Telegraph. Pacman and the game 'Quar'. All in machine code. Test and fun with joystick controls. Uses Hi-Res colour graphics. BK or larger expansion needed. Only £9.90 + 50p P&P complete with instructions.

RATMAN (BK EXPANSION)

Another amazing game from Llamasoft!! You are the man under attack by the deadly rats as they fall from the sky. You must dodge the arrows to get to the rats and then squash them with your hammer before they dig under the platform on which you stand and mutate into devils. Game with great graphics to make an extremely addictive game. BK or larger memory expansion needed. Hi-Res colour graphics. In machine code. Only £9.90 + 50p P&P complete with instructions.

BREAKOUT/DEFLEX

Unspooled package a full feature version of the popular arcade Breakout plus a new concept game, Deflex! Both programs on one cassette only £9.95

BILTZKRIEG

As seen at the Commodore show and reviewed by the Daily Telegraph. Play your Vulcan Bomber over the enemy city and destroy the buildings. 25 levels of play, uses Hi-Res colour graphics and plays Ryle Bantzab between waves. Only £4.95 complete with instructions.

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Create your very own custom characters for the unspooled VIC 20, up to 34 characters with facilities such as reflect and save on cassette also.

NEW J

NEW J

NEW J

SPECTRUM

GRAPHICS CREATOR (16K)

Not just another character editor! Allows you to define not only the 21 user definable characters. Also allows you to change the entire 96 character ASCII set. Creates BVTLS file ready for you to load into your own programs. Includes advanced reflect, invert, field commands etc. Complete with full documentation. Use the BVTLS segment and use Graphics Creator with its easy on screen cursor editing. £2.95 + 50p P&P

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Yes a full feature version of the popular game. BIZ supplied for the 16K or 48K Spectrum. For only £2.95 + 50p P&P

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Beat the falling minutes as they invade your planet, create missiles, are your only defence in the world of disaster. If they break through the crust of your planet then you die. Support systems will fail. An addictive game with fast action and great graphics. 16K or 48K Spectrum only £2.95 + 50p P&P

SUPERDEFLEX (48K)

Bounce, Sid, the space invader, around the screen into the power pods, keeping away of course from the devil and chasing you around the screen. Steer with your Deflex shield, but beware the mines or you may be buried alive! Superb graphics and fantastic sound on the 48K Spectrum only. Only £4.95 on cassette + 50p P&P

ATARI 400-600

TUNEDFLEX

Superb ultra fast and totally new ball game. Uses ATARI's unique Apollon to the full. Incorporates superb colour/sound effects and uses Player/Missile graphics. Tables top 10 score along with Score's name. £9.90 + 50p P&P

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Now you can define your own custom character sets or edit existing sets. Results are fully displayed on screen in modes 0 1 2. Special features include reflect, invert, save character sets etc. Supplied on cassette with disc sheet only £9.90 + 50p P&P

2601

CENTIPED (16K)

The ORIGINAL game from the ORIGINAL author. This is the identical program to that being sold by other companies for three times the price. The game has received scathing reviews in the computing press. Program has 20 speed levels and ever increasing 'Colossal' border. 'Rocket Jet' to access and master. Why wait to play more? Only £1.95 + 50p P&P

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And now for the big picture.

TRADER A trilogy of 16K programmes that combine to give an epic 48K graphic adventure. As a galactic trader, you deal with some very bizarre customers indeed. Will you live to tell the tale? ZX81 £10.50 VIC20 £18.50 (tape or disc)

SUBSPACE STRIKER Our top selling, big screen graphic game. With your deadly Antimat torpedoes, you unleash havoc in the Federation spacelanes and try to drive back to the safety of subspace, fast. ZX81 £5.50, VIC20 £9.50 16K

STARQUEST A voyage of discovery and adventure in the cosmos. With the help of your onboard computer, you seek a habitable planet amidst the perils of deep space. ZX81 £5.50, VIC20 £9.50 16K

ENCOUNTER Would you know what to do if you encountered extra-terrestrial beings? In this adventure, you are snatched off the Earth and the space invaders play YOU! ZX81 £5.50, VIC20 £9.50 16K

ZOR Battle of the robots. Fight for survival in this action-packed strategy game. Megajoules of destructive energy in a futuristic duel. ZX81 £5.50, VIC20 £9.50 16K

PIXEL POWER At last it is easy to create your own custom characters on the BK plus expanded VIC20. A graphics workshop packed with useful features like Create, Amend, Save, View Set, £9.50. Refreshes the pixels that other programmes can't reach. (See Pixel Power in action in Trader and Subspace Striker)

HARVESTER Reap your reward in the Bootherspace fields around the planet Delta. A cut-throat strategy game for 2 to 4 players for the unexpanded VIC20, £4.50

BRAINSTORM The telepathic emissions of the friendly Pions can wreck a human brain. Can you get our three space explorers across a river of nasty goo without blowing their minds. Unexpanded VIC20 £4.50

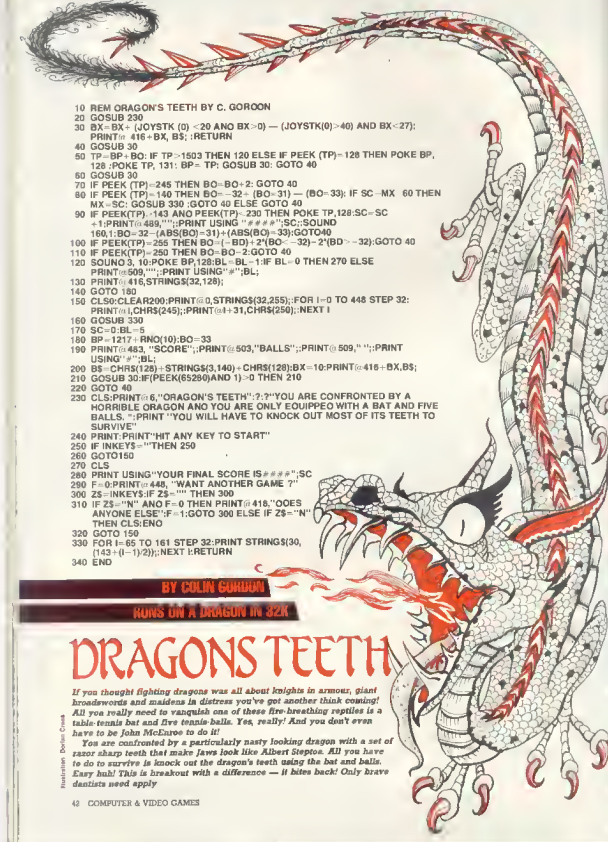
GUITARPIX 1 For the VIC20 owner who wants to play the guitar. The first of a series that shows how to tune the guitar and demonstrates some elementary chords. Unexpanded VIC20 £4.50

Send SAE for more details

PIXEL

Pixel Productions 39 Ripley Gdns London SW14 6HF

[illegible]



```

10 REM ORAGON'S TEETH BY C. GOROON
20 GOSUB 230
30 BX=BX+(JOYSTK(0)<20 AND BX>0)-(JOYSTK(0)>40) AND BX<27;
  PRINT@ 416+BX,B$;:RETURN
40 GOSUB 30
50 TP=BP+BO: IF TP>1503 THEN 120 ELSE IF PEEK(TP)=128 THEN POKE BP,
  128 :POKE TP, 131: BP= TP: GOSUB 30: GOTO 40
60 GOSUB 30
70 IF PEEK(TP)=245 THEN BO=BO+2: GOTO 40
80 IF PEEK(TP)=140 THEN BO=-32-(BO+31)-(BO-33): IF SC=MX 60 THEN
  MX=SC: GOSUB 330: GOTO 40 ELSE GOTO 40
90 IF PEEK(TP)=143 AND PEEK(TP)<230 THEN POKE TP,128:SC=SC
  +1:PRINT@ 489,"":PRINT USING "####";SC;:SOUND
  160,1:BO=32-(ABS(BO)=31)+(ABS(BO)=33):GOTO 40
100 IF PEEK(TP)=255 THEN BO=(-BO)+2*(BO<-32)-2*(BO>-32):GOTO 40
110 IF PEEK(TP)=250 THEN BO=BO-2:GOTO 40
120 SOUND 3, 10:POKE BP,128:BL=BL-1:IF BL=0 THEN 270 ELSE
  PRINT@ 509,"":PRINT USING "":BL;
130 PRINT@ 416,STRING$(32,128);
140 GOTO 160
150 CLS@:CLEAR200:PRINT@ 0,STRING$(32,255);:FOR I=0 TO 448 STEP 32:
  PRINT@ I,CHR$(245);:PRINT@ I+31,CHR$(250);:NEXT I
160 GOSUB 330
170 SC=0:BL=5
180 BP=1217+RND(10):BO=33
190 PRINT@ 483, "SCORE";:PRINT@ 503,"BALLS";:PRINT@ 509,"":PRINT
  USING "":BL;
200 BS=CHR$(128)+STRING$(3,140)+CHR$(128):BX=10:PRINT@ 416+BX,B$;
210 GOSUB 30:IF(PEEK(65280)AND 1)>0 THEN 210
220 GOTO 40
230 CLS:PRINT@ 6,"ORAGON'S TEETH":?:"YOU ARE CONFRONTED BY A
  HORRIBLE ORAGON AND YOU ARE ONLY EQUIPPED WITH A BAT AND FIVE
  BALLS.":PRINT "YOU WILL HAVE TO KNOCK OUT MOST OF ITS TEETH TO
  SURVIVE"
240 PRINT:PRINT"HIT ANY KEY TO START"
250 IF INKEY$="" THEN 250
260 GOTO 150
270 CLS
280 PRINT USING "YOUR FINAL SCORE IS ####";SC
290 F=0:PRINT@ 448, "WANT ANOTHER GAME ?"
300 Z$=INKEY$:IF Z$="" THEN 300
310 IF Z$="N" AND F=0 THEN PRINT@ 416,"OOES
  ANYONE ELSE":F=1:GOTO 300 ELSE IF Z$="N"
  THEN CLS:END
320 GOTO 150
330 FOR I=65 TO 161 STEP 32:PRINT STRING$(30,
  (143+(I-1)/2));:NEXT I:RETURN
340 END

```

BY COLIN GORDON

RUNS ON A DRAGON IN 32K

DRAGONS TEETH

If you thought fighting dragons was all about knights in armour, giant broadswords and maidens in distress you've got another think coming! All you really need to vanquish one of these fire-breathing reptiles is a table-tennis bat and five tennis-balls. Yes, really! And you don't even have to be John McEnroe to do it!

You are confronted by a particularly nasty looking dragon with a set of razor sharp teeth that make jaws look like Albert Steptoe. All you have to do to survive is knock out the dragon's teeth using the bat and balls. Easy huh! This is breakout with a difference — it bites back! Only brave dentists need apply

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You risk your back from a universal fleet. This program has various ways for you to battle against going in for the home (only) yet still test your advanced human being. £9.00

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Are you really fast action Bomber game for the VIC 20. With high resolution colour graphics. Faster the enemy city before its too late. £5.00

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The great way through the myriad of landing stars to survive. Keyboard or joystick control, high res. joystick colour graphics. £5.00

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Your Planet is under attack by a fourth dimension and your only escape is by laser and to the mother ship. However you must find dodge your way through the Astroblasts and onto the landing pad before landing home. Keyboard or joystick control. High resolution colour graphics. £5.00

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Can you get a Birdie or better your handicap coming along? A real time 36 hole golf course puts you to the test. One or two players, check it out! Both ways show. See you at the 18th. £9.99

STAR SWANK - MACHINE CODE

A novel games disc - measure the shots around the arena to get the stars but watch it or you may not survive! £1.99

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ATARI 400/600 16.5

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44 COMPUTER & VIDEO GAMES



CURSE OF THE

BY DAVID HEALEY



Somewhere in the Mountains of the Moon there lies an ancient Aztec temple. Inside this crumbling ruin there is a treasure so strange, so valuable and so cunningly hidden that bounty hunters from all over the world have been lured to take up the challenge to discover it.

But so far none have managed to unearth the treasure from its ancient resting place.

They have all fallen victim to the Curse of the Aztec Tomb. There are many unmentionable dangers for the would-be treasure hunter to overcome once he steps into the musty depths of the tomb and the only clue to the treasure's hiding place is a curious

```

45 GOTO 9500
50 LET X=25
55 LET M=1
60 LET Y=12
65 LET G=0
70 LET S=1000
75 LET M1=0
80 LET U=0
90 GOSUB 3000
100 GOSUB 2000
200 PRINT AT A-1,C+1;" "
225 IF A=21 THEN GOSUB 2000
230 PRINT AT A,C;"0"
300 LET S=S-25
320 LET A=A+1
335 LET C=C+1
350 IF A=Y AND C=X THEN GOTO 95
350 PRINT AT Y,X;"+"
360 IF INKEY$="1" THEN GOSUB 30
370 IF INKEY$="0" THEN GOTO 320
500 GOTO 270
600 LET A=3
610 LET C=13
620 RETURN
630 LET X=X-1
640 LET S=S+100
650 LET Y=Y-1
660 PRINT AT Y+1,X+2;" "
670 IF Y=2 THEN GOTO 3500
680 RETURN
690 PRINT AT Y,X;" "
700 LET S=S-200
710 LET Y=Y-2
720 PRINT AT Y,X;"+"
730 IF C=X-1 THEN GOTO 3240
740 PRINT AT Y,X;" "
750 LET Y=Y+2
760 GOTO 240
770 PRINT AT A-1,C-1;" "
780 FOR Q=1 TO 3
790 PRINT AT Y,Q;" "
800 LET A=A+1
810 LET C=C+1
820 PRINT AT A,C;"0"
830 NEXT Q
840 PRINT AT A,C;" "
850 GOTO 3236
860 LET X=12
870 LET Y=2
880 LET S=300
890 PRINT AT Y,X;"+"
900 IF X=4 THEN GOTO 3560
910 IF INKEY$="0" THEN GOTO 40
920 IF INKEY$="1" THEN GOTO 270
3570 IF X=10 AND Y=2 THEN GOTO 4
3600 IF X=7 AND Y=2 THEN GOTO 4200
3650 LET S=S-25
3680 IF X=5 AND Y=2 THEN GOTO 4200
3695 IF X=12 THEN LET X=12
3700 IF X=3 THEN GOTO 4400
3710 GOTO 3538
3720 PRINT AT Y,X;" "
3730 LET X=X-1
3740 LET S=S+100
3750 PRINT AT Y,X;"+"
3760 IF X=5 THEN GOTO 3560
3770 GOTO 3570
3780 LET Y=Y+1
3790 PRINT AT Y+1,X;" "
3800 PRINT AT Y,X;"+"
3810 LET Y=Y-2
3820 LET X=X-1
3830 PRINT AT Y+1,X+1;" "
3840 PRINT AT Y,X;"+"
3850 LET Y=Y+1
3860 LET X=X-1
3870 PRINT AT Y-1,X+1;" "
3880 LET Y=Y+1
3890 PRINT AT Y,X;"+"
3900 LET S=S-75
3910 GOTO 3570
3920 FOR I=1 TO 3
3930 PRINT AT Y,X;" "
3940 LET Y=Y+1
3950 PRINT AT Y,X;"+"
3960 GOTO 3550
3970 LET S=S+300
3980 LET S=S-10
3990 IF INT (RND*10)=1 THEN GOTO 5000
4000 IF INT (RND*10)=2 THEN GOTO 5300
4010 IF INKEY$="0" THEN GOTO 5500
4020 IF U=1 THEN GOTO 4500
4030 LET U=1
4040 LET M=0
4050 PRINT AT 9,3;" ";AT 10,3;" "
4060 PRINT AT 9,1;" ";AT 10,1;" "
4070 PRINT AT 11,2;" "
4080 PRINT AT 3,1;" ";AT 10,1;" "
4090 PRINT AT 0,0;" ";AT 10,1;" "
4100 PRINT AT 11,2;" "
4110 PRINT AT 9,0;" ";AT 10,1;" "
4120 PRINT AT 9,0;" "
4130 PRINT AT 9,0;" "
4140 PRINT AT 9,0;" "
4150 PRINT AT 9,0;" "
4160 PRINT AT 9,0;" "
4170 PRINT AT 9,0;" "
4180 PRINT AT 9,0;" "
4190 PRINT AT 9,0;" "
4200 PRINT AT 9,0;" "
4210 PRINT AT 9,0;" "
4220 PRINT AT 9,0;" "
4230 PRINT AT 9,0;" "
4240 PRINT AT 9,0;" "
4250 PRINT AT 9,0;" "
4260 PRINT AT 9,0;" "
4270 PRINT AT 9,0;" "
4280 PRINT AT 9,0;" "
4290 PRINT AT 9,0;" "
4300 PRINT AT 9,0;" "
4310 PRINT AT 9,0;" "
4320 PRINT AT 9,0;" "
4330 PRINT AT 9,0;" "
4340 PRINT AT 9,0;" "
4350 PRINT AT 9,0;" "
4360 PRINT AT 9,0;" "
4370 PRINT AT 9,0;" "
4380 PRINT AT 9,0;" "
4390 PRINT AT 9,0;" "
4400 PRINT AT 9,0;" "
4410 PRINT AT 9,0;" "
4420 PRINT AT 9,0;" "
4430 PRINT AT 9,0;" "
4440 PRINT AT 9,0;" "
4450 PRINT AT 9,0;" "
4460 PRINT AT 9,0;" "
4470 PRINT AT 9,0;" "
4480 PRINT AT 9,0;" "
4490 PRINT AT 9,0;" "
4500 PRINT AT 9,0;" "
4510 PRINT AT 9,0;" "
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4610 PRINT AT 9,0;" "
4620 PRINT AT 9,0;" "
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4640 PRINT AT 9,0;" "
4650 PRINT AT 9,0;" "
4660 PRINT AT 9,0;" "
4670 PRINT AT 9,0;" "
4680 PRINT AT 9,0;" "
4690 PRINT AT 9,0;" "
4700 PRINT AT 9,0;" "
4710 PRINT AT 9,0;" "
4720 PRINT AT 9,0;" "
4730 PRINT AT 9,0;" "
4740 PRINT AT 9,0;" "
4750 PRINT AT 9,0;" "
4760 PRINT AT 9,0;" "
4770 PRINT AT 9,0;" "
4780 PRINT AT 9,0;" "
4790 PRINT AT 9,0;" "
4800 PRINT AT 9,0;" "
4810 PRINT AT 9,0;" "
4820 PRINT AT 9,0;" "
4830 PRINT AT 9,0;" "
4840 PRINT AT 9,0;" "
4850 PRINT AT 9,0;" "
4860 PRINT AT 9,0;" "
4870 PRINT AT 9,0;" "
4880 PRINT AT 9,0;" "
4890 PRINT AT 9,0;" "
4900 PRINT AT 9,0;" "
4910 PRINT AT 9,0;" "
4920 PRINT AT 9,0;" "
4930 PRINT AT 9,0;" "
4940 PRINT AT 9,0;" "
4950 PRINT AT 9,0;" "
4960 PRINT AT 9,0;" "
4970 PRINT AT 9,0;" "
4980 PRINT AT 9,0;" "
4990 PRINT AT 9,0;" "
5000 PRINT AT 9,0;" "
5010 PRINT AT 9,0;" "
5020 PRINT AT 9,0;" "
5030 PRINT AT 9,0;" "
5040 PRINT AT 9,0;" "
5050 PRINT AT 9,0;" "
5060 PRINT AT 9,0;" "
5070 PRINT AT 9,0;" "
5080 PRINT AT 9,0;" "
5090 PRINT AT 9,0;" "
5100 PRINT AT 9,0;" "
5110 PRINT AT 9,0;" "
5120 PRINT AT 9,0;" "
5130 PRINT AT 9,0;" "
5140 PRINT AT 9,0;" "
5150 PRINT AT 9,0;" "
5160 PRINT AT 9,0;" "
5170 PRINT AT 9,0;" "
5180 PRINT AT 9,0;" "
5190 PRINT AT 9,0;" "
5200 PRINT AT 9,0;" "
5210 PRINT AT 9,0;" "
5220 PRINT AT 9,0;" "
5230 PRINT AT 9,0;" "
5240 PRINT AT 9,0;" "
5250 PRINT AT 9,0;" "
5260 PRINT AT 9,0;" "
5270 PRINT AT 9,0;" "
5280 PRINT AT 9,0;" "
5290 PRINT AT 9,0;" "
5300 PRINT AT 9,0;" "
5310 PRINT AT 9,0;" "
5320 PRINT AT 9,0;" "
5330 PRINT AT 9,0;" "
5340 PRINT AT 9,0;" "
5350 PRINT AT 9,0;" "
5360 PRINT AT 9,0;" "
5370 PRINT AT 9,0;" "
5380 PRINT AT 9,0;" "
5390 PRINT AT 9,0;" "
5400 PRINT AT 9,0;" "
5410 PRINT AT 9,0;" "
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5490 PRINT AT 9,0;" "
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5550 PRINT AT 9,0;" "
5560 PRINT AT 9,0;" "
5570 PRINT AT 9,0;" "
5580 PRINT AT 9,0;" "
5590 PRINT AT 9,0;" "
5600 PRINT AT 9,0;" "
5610 PRINT AT 9,0;" "
5620 PRINT AT 9,0;" "
5630 PRINT AT 9,0;" "
5640 PRINT AT 9,0;" "
5650 PRINT AT 9,0;" "
5660 PRINT AT 9,0;" "
5670 PRINT AT 9,0;" "
5680 PRINT AT 9,0;" "
5690 PRINT AT 9,0;" "
5700 PRINT AT 9,0;" "
5710 PRINT AT 9,0;" "
5720 PRINT AT 9,0;" "
5730 PRINT AT 9,0;" "
5740 PRINT AT 9,0;" "
5750 PRINT AT 9,0;" "
5760 PRINT AT 9,0;" "
5770 PRINT AT 9,0;" "
5780 PRINT AT 9,0;" "
5790 PRINT AT 9,0;" "
5800 PRINT AT 9,0;" "
5810 PRINT AT 9,0;" "
5820 PRINT AT 9,0;" "
5830 PRINT AT 9,0;" "
5840 PRINT AT 9,0;" "
5850 PRINT AT 9,0;" "
5860 PRINT AT 9,0;" "
5870 PRINT AT 9,0;" "
5880 PRINT AT 9,0;" "
5890 PRINT AT 9,0;" "
5900 PRINT AT 9,0;" "
5910 PRINT AT 9,0;" "
5920 PRINT AT 9,0;" "
5930 PRINT AT 9,0;" "
5940 PRINT AT 9,0;" "
5950 PRINT AT 9,0;" "
5960 PRINT AT 9,0;" "
5970 PRINT AT 9,0;" "
5980 PRINT AT 9,0;" "
5990 PRINT AT 9,0;" "
6000 PRINT AT 9,0;" "

```

AZTEC TOMB



RUNS ON A ZX81 IN 16K

Aztec symbol — which looks strangely like a modern dollar sign. But you'll have to struggle to even find that . . .

This is an adventure game based almost entirely on graphics and you have to explore the scene presented to you on the screen. The only controls you have are the 'I' key which is the walk command and the 'O' key which can be used to make your explorer, represented by a plus sign, jump over any obstacles.

You start the game at the base of the mountain and the entrance to the tomb is on the far side. Once you are at the base of the mountain there is no turning back . . .

```

1,1,"",AT 11,2;" "
5080 PRINT AT 10,0,"";RT 11
1,1,""
5085 PRINT AT 10,0;" ";
AT 11,1,""
5090 PRINT AT 12,0,""
5100 GOTO 4500
5300 IF U=0 THEN GOTO 4500
5310 LET U=0
5315 LET M=1
5320 PRINT AT 12,0,""
5325 PRINT AT 10,0,"";AT 11,1,""
5330 PRINT AT 10,0,"";RT 11,1;" "
5335 PRINT AT 9,0,"";AT 10,1;" "
5340 PRINT AT 9,0,"";AT 10,1;" "
5345 PRINT AT 9,1,"";AT 10,1;" "
5350 PRINT AT 9,1,"";AT 10,1;" "
5355 PRINT AT 9,1,"";AT 10,1;" "
5360 PRINT AT 9,1,"";AT 10,1;" "
5365 PRINT AT 9,1,"";AT 10,1;" "
5370 PRINT AT 9,3,"";AT 10,3," "
5375 IF M=1 AND M1=1 THEN GOTO 5
5380 GOTO 4500
5385 LET M1=1
5390 PRINT AT Y,X," "
5400 LET S=5+100
5410 LET Y=Y-1
5420 PRINT AT Y,X;"+"
5430 IF M=1 THEN GOTO 5540
5435 IF INT (RAND*3)=1 THEN GOTO
5440 LET Y=Y-1
5445 LET X=X-1
5450 PRINT AT Y,X+5," "
5455 PRINT AT Y,X;"+"
5460 LET Y=Y+1
5465 LET X=X+1
5470 PRINT AT Y-1,X+1;" "
5475 PRINT AT Y,X;"+"
5480 FOR K=1 TO 10
5485 PRINT AT Y,X," "
5490 LET Y=Y+1
5495 PRINT AT Y,X;"+"
5500 IF Y=11 AND U=1 THEN GOTO 6
5505 NEXT K
5510 LET S=5-750
5515 PRINT AT 10,0;"+"
5520 PRINT AT 10,0;" "
5525 FOR J=1 TO 50
5530 NEXT J
5535 IF G=1 THEN GOTO 5850
5597 CLS
5700 PRINT "GOOD GRIEF, WHO O
O YOU THINK"
5710 PRINT "YOU ARE, SUPERHERN. F
RNCY DOING"
5720 PRINT "R SWRN DIVE OFF THE
90P OF R"
5730 PRINT "CLIFF. WHRT SOME PEO
PLE WILL DO"
5740 PRINT "FOR R BIT OF AZTEC T
REASURE."
5750 PRINT
5760 PRINT "YOU SCORED ";S
5770 PRINT "PRESS N/L TO RE-STRR
T"
5780 IF INKEY$="" THEN GOTO 5785
5785 CLS
5790 GOTO 50
5800 IF INT (RAND*3)=2 THEN GOTO
5700
5805 LET S=5-15
5810 IF Y=2 THEN LET X=8
5815 IF X=4 AND INT (RAND*5)=2 TH
EN GOTO 7200
5820 IF X=8 THEN GOTO 7000
5830 IF INKEY$="1" THEN GOTO 630
0
5870 IF INKEY$="0" THEN GOTO 690
0
6110 GOTO 6050
6300 LET Y=Y+1
6310 PRINT AT Y,X-1;" "
6320 PRINT AT Y,X;"+"
6325 LET S=5+100
6330 GOTO 6050
6700 LET Y1=12
6710 LET Y1=0
6720 PRINT AT Y1-1,X1;" "
7220 PRINT AT 9,3;" "
7230 GOSUB 7300
7240 PRINT AT 10,3;" "
7250 GOSUB 7300
7260 PRINT AT 10,3;" "
7270 GOSUB 7300
7280 PRINT AT 11,3;" "
7290 GOSUB 7300
7295 PRINT AT 11,3;" "
7297 GOTO 7350
7300 REH
7310 RETURN
7320 LET S=5-300
7350 CLS
7360 PRINT "AN INTERESTING FE
RTURE OF "
7370 PRINT "AZTEC ARCHITECTURE I
S THE CLEVER"
7380 PRINT "LITTLE CEILINGS THRT
LOVER"
7390 PRINT "THEMSELVES DOWN ON T
OP OF"

```



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... Kill the birds. Your ship has 8 directions of fire. Remember they like their eggs. They have a helper... watch out!

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... Now the birds have gone, it will be easy. All you do is pick them off the ground and return them to the 'Safe area' for elimination. Wait... what was that. Look out!! It's two robo... AGGGGGH

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```

9150 PRINT "
9160 PRINT "
9170 PRINT "
9180 PRINT "
9200 RETURN
9300 FOR J=1 TO 50
9301 NEXT J
9302 CLS
9303 PRINT " YOU HAVE BEEN 500
PHEMED BY R"
9305 PRINT "BOULDER. YOU'RE CERTA
INLY NOT THE"
9310 PRINT "ATHLETIC TYPE ARE YOU"
9315 PRINT
9317 LET S=5-500
9320 PRINT "YOU SCORED ";S
9325 PRINT
9330 PRINT "PRESS N/L TO RE-STAR
T"
9335 IF INKEY$="" THEN GOTO 9335
9338 CLS
9340 GOTO 50
9350 FOR J=1 TO 50
9351 NEXT J
9353 LET S=5-500
9354 CLS
9355 PRINT " YOU HAVE DROWNED
IN THE MORT "
9360 PRINT "ISNT IT ABOUT TIME Y
OU GET TO"
9365 PRINT "TO SWIM? I SUPPOSE I
TS A BIT"
9370 PRINT "LATE THOUGH NOW."
9375 PRINT
9380 PRINT "YOU SCORED ";S
9385 PRINT
9390 PRINT "PRESS N/L TO RE-STAR
T"
9395 IF INKEY$="" THEN GOTO 9395
9400 CLS
9410 GOTO 50
9500 PRINT AT 2,4,"CURSE OF THE
AZTEC TEMPLE"
9510 PRINT AT 6,0," YOU ARE FA
CED WITH THE TASK"
9520 PRINT AT 1,0,"OF EXPLORING A SACRE
D MOUNTAIN"
9530 PRINT "OF THE AZTECS, IN WH
ICH ONE OF"
9540 PRINT "THEIR GREAT LEADERS
IS UNKHOURED"
9550 PRINT "TO BE BURIED ALONG W
ITH UNTO"
9560 PRINT "RICHES IN ANCIENT RE
LICS."
9570 PRINT " THE ONLY CLUE YOU
HAVE IS"
9580 PRINT "THAT YOU MUST SEEK U
UT R KEY"
9590 PRINT "WHICH CLOSELY RESEMB
LES A DOLLAR"
9600 PRINT "SIGN."
9610 PRINT "BEURRE OF THE CURSE.
THERE ARE"
9620 PRINT "HANY DANGERS TO FACE
ON YOUR WAY"
9630 PRINT "TO THE TREASURE, 500
D LUCK"
9640 PRINT " KEY 1 ALLOWS YOU
TO MOVE"
9650 PRINT "FORWARD AND KEY 0 AL
LWS YOU TO"
9660 PRINT "JUMPH. PRESS N/L TO S
TART"
9670 PRINT AT 0,0,"
9680 PRINT AT 4,0,"
9690 PRINT AT 1,0,"";AT 2,0,""
9700 PRINT AT 1,31,"";AT 2,31,""
9710 PRINT AT 3,31,""
9710 IF INKEY$="" THEN GOTO 9710
9715 CLS
9720 GOTO 50
9780 SAVE "ONLY "
9990 GOTO 1

```

Meanwhile back in space ... the long and winding tunnel faces our brave astronaut trapped deep in the heart of a very unfriendly planet.

You have to steer a ship through the tunnel avoiding outcrops of rock and deadly mines. To keep the

ship flying you must navigate through fuel gates which you'll find tucked away in the tunnel.

There is a high score feature built into the program and you can alter the width of the tunnel as you get more skilful

at navigating through the tortuous twists and turns. Control keys are '4' for left and '6' for right.

So now it's all up to you — are you a space-age artful dodger?

RUNS ON A

3000 SERIES PET

IN 8K

BY NEIL STEVENSON

TUNNEL RUN

```

5 REM***** TUNNELRUN *****
6 REM*** OCT.1982 BY NEIL STEVENSON***
10 PRINT "J":FORA=32768T032897:POKEA,160:NEXT
20 FORA=32807T033767STEP40:POKEA,160:NEXT
30 FORA=33767T033728STEP-1:POKEA,160:NEXT
40 FORA=33767T033728STEP-40:POKEA,160:NEXT
50 PRINT "*****"
60 PRINT "*****"
70 PRINT "*****"
71 PRINT "FLY YOUR SHIP(V) THROUGH THE WINDING";
72 PRINT "TUNNEL, AVOIDING MINES(M) AND "
73 PRINT "OUTCROPS OF ROCK. NAVIGATE THROUGH"
74 PRINT "THE FUEL GATES(G) FOR A BONUS."
75 PRINT "4-MOVE LEFT 6-MOVE RIGHT"
76 PRINT "INPUT WIDTH OF TUNNEL(3-IMPOSSIBLE)"
77 PRINT "EASY"
78 GETA:GG=VAL(A):IFGG<3ORGG>11THEN78
79 GG=GG+2
100 PRINT "J".G=33272:PRINT "*****"
    REM+25 CURSOR DOWNS+
110 H=33748:FORA=HTOH-(40+12)STEP-40:POKEA,160:NEXT
115 FORA=H+GGTOH+GG-(40+12)STEP-40:POKEA,160:NEXT
120 POKEG,32:POKEH,160:POKEH+GG,160:PRINT "POKEG,22
130 IFPEEK(G+40)>32THEN500
140 GG=GG+1
150 IFPEEK(151)=41THENPOKEG,32:G=G+1:GOTO240
160 IFPEEK(151)=42THENPOKEG,32:G=G-1:GOTO240
170 A=INT(RND(1)*8)+1
175 IFA=1ANDH<33728THENH=H-1:GOTO120
180 IFA=1THENH=H+1:GOTO120
190 IFA=2ANDH<(33767-GG)THENH=H+1:GOTO120
200 IFA=2THENH=H-1:GOTO120
210 IFA=3THENH=H+INT(RND(1)*GG-3)+3:POKECH,81:
    POKECH+1,64:POKECH+2,81:GOTO120
220 IFA=4THENPOKEH+1,160:POKEH+2,160:POKEH+3,
    160:GOTO120
230 IFA=5THENPOKEH+GG-1,160:POKEH+GG-2,160
    POKEH+GG-3,160:GOTO120
231 IFA=6THENPOKEH+INT(RND(1)*GG-3)+3,90:GOTO120
  
```

```

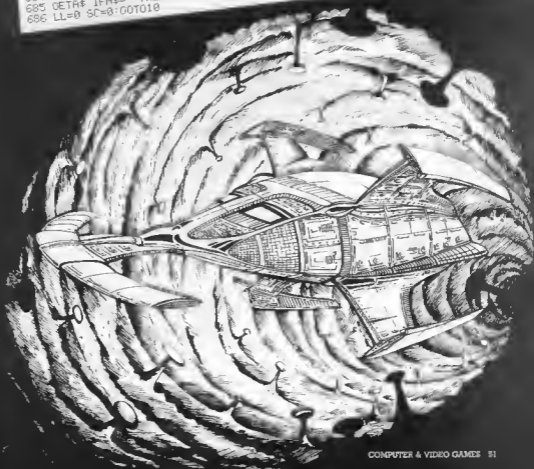
205 A=INT(RND(1)*2)+1*GOTO175
240 IFPEEK(0) < 32ORPEEK(6+40) < 32THEN500
250 POKE(32) GOTO170
500 IFPEEK(0) = 64ORPEEK(6+40) = 64THENPOKE(40,32) SC=SC+10*GOTO170
510 FORA=1TO10:POKE(160) FORB=1TO50 NEXT:NEXT
520 POKE(0,32*LL+1) IFLL>2THEN540
530 GOTO100
540 PRINT "GAME OVER"
550 AS$="      " FORA=1TO21 PRINTMID$(AS,A,1); FORB=1TO100 NEXT:NEXT
560 PRINT "*****"
570 FORA=1TO2000 NEXT
580 PRINT " "
590 IFSC>HSTHEN630
600 PRINT "*****"
610 PRINT " "
620 PRINT " "
621 POKE150,0
625 GETA$ IF A$="" THEN625
626 SC=0 LL=0 GOTO10
630 PRINT "*****";
640 PRINT "*****";
650 PRINT "*****";
660 PRINT "*****";
670 PRINT "*****";
680 PRINT "*****";
684 POKE150,0 HS=SC
685 GETA$ IF A$="" THEN685
686 LL=0 SC=0 GOTO10

```

```

620 POKE158,0
625 GETA$ IF A$="" THEN 625
626 SC=0 LL=0:GOTO10
630 PRINT "*****";
640 PRINT "*****";
650 PRINT "*****";
660 PRINT "*****";
670 PRINT "*****";
680 PRINT "*****";
684 POKE158,0:HS=SC
685 GETA$ IF A$="" THEN 1685
686 LL=0 SC=0:GOTO10

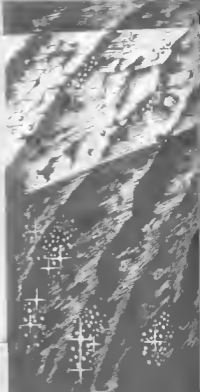
```



```

1 MODE7
2 FX=0
3 ENVELOPE1, 1, -26, -26, -26, 255, 255, 255, 50, 0, 0, -50, 43, 0
4 ENVELOPE2, 1, 1, 1, 1, 10, 10, 80, 100, -1, 0, 0, 100, 0
10 PROCINIT
11 MODE7:YX=1:VDU23;B202;0;0;0;
15 SOUND1, 1, 255, 255
20 PRINTTAB(0,21)"CAVE FLIGHT"
30 UP=2:DOWN=15
40 X=10:FORIX=0TO20:PRINTTAB(0,1X)CHR$(89):NEXT
45 TIME=0
46 REPEAT
47 FORIX=0TO20:PRINTTAB(39,1X) " " :NEXT
48 IFX(40) THEN TIME=0
50 FORIX=0TOUP:PRINTTAB(39,1X)CHR$(255):NEXT
60 FORIX=DOWN TO20:PRINTTAB(39,1X)CHR$(255):NEXT
70 PRINTTAB(1,X) " "
80 AS=INKEY$(0):IFAS="A" AND X)2 THEN X=X-1
90 IFAS="Z" AND X(20) THEN X=X+1
100 JX=HIMEM+3+40*X:JX=JX
110 IF JX<255 OR TIME)1000 THEN 3000
120 IF JX=ASC(")") THEN TIME=0:SOUND2, 2, 100, 20
123 IF AND(I0)=1 THEN PRINTTAB(37, AND(DOWN-UP)+UP)CHR$(
&B1+AND(5)):"*":CHR$(89)
124 YX=YX+1:IFYX=30 THEN PRINTTAB(37, AND(DOWN-UP)+UP)CH
R$(81):"*":CHR$(89):YX=YX+1
125 CALL START
127 PRINTTAB(1,X)CHR$(244):CHR$(240)
130 PRINTTAB(0,22)"TIME LEFT ":10-(TIME DIV 100):"
140 PRINTTAB(0,23)"DIST. TRAVELLED!":FX:FX=FX+1
150 UP=UP+AND(3)-2:DOWN=DOWN+AND(3)-2:IFDOWN(5) THEN DOW
N=DOWN+AND(5)
160 IF UP)15 THEN UP=UP-AND(5)
170 IF UP(1)THENUP=1
175 IF DOWN)19 THEN DOWN=19
177 IF DOWN(=UP+2) THEN DOWN=UP+4
180 UNTIL FALSE
2000 DEFPROCINIT
2010 DIM X 140
2020 FORPASS=0TO2 STEP2
2030 PK=X
2040 OPT PASS
2050 START LDX #2
2060 PP LDA HIMEM,X
2070 STA HIMEM-I,X
2080 LDA HIMEM+40,X
2090 STA HIMEM+39,X
2100 LDA HIMEM+80,X
2110 STA HIMEM+79,X
2120 LDA HIMEM+120,X
2130 STA HIMEM+119,X
2140 LDA HIMEM+160,X
2150 STA HIMEM+159,X
2160 LDA HIMEM+200,X
2170 STA HIMEM+199,X
2180 LDA HIMEM+240,X
2190 STA HIMEM+239,X
2200 LDA HIMEM+280,X
2210 STA HIMEM+279,X
2220 LDA HIMEM+320,X
2230 STA HIMEM+319,X
2240 LDA HIMEM+360,X
2250 STA HIMEM+359,X
2260 LDA HIMEM+400,X
2270 STA HIMEM+399,X
2280 LDA HIMEM+440,X
2290 STA HIMEM+439,X
2300 LDA HIMEM+480,X
2310 STA HIMEM+479,X
2320 LDA HIMEM+520,X
2330 STA HIMEM+519,X
2340 LDA HIMEM+560,X
2350 STA HIMEM+559,X
2360 LDA HIMEM+600,X
2370 STA HIMEM+599,X
2380 LDA HIMEM+640,X
2390 STA HIMEM+639,X
2400 LDA HIMEM+680,X
2410 STA HIMEM+679,X
2420 LDA HIMEM+720,X
2430 STA HIMEM+719,X
2440 LDA HIMEM+760,X
2450 STA HIMEM+759,X
2460 LDA HIMEM+800,X
2470 INX
2480 CPX #40
2490 BEQ P
2500 JMP PP
2510 P RTS
2515 -
2520 NEXT PASS
2540 ENDPROC
3000 PRINTTAB(10,11)"GAME OVER"
3001 PRINTTAB(9,12)CHR$(87):"YOUR SCORE ":FX
3002 PRINTTAB(9,13)CHR$(87)"HIGH SCORE ":HX
3003 IFX)HX THEN PRINTTAB(8,14)CHR$(87):CHR$(88):"YOU
GOT THE HIGH SCORE!":HX=FX
3005 #FX15,0
3010 FORI=1 TO 1000:NEXT:RUN

```



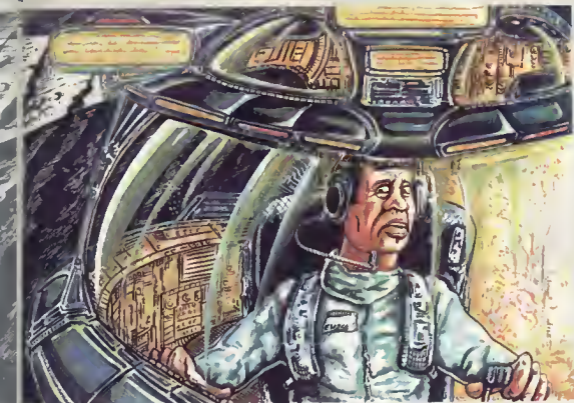
CAI

RUNS ON A BBC

MODEL A & B IN 16K

BY S. R. BLACKBURN

The year is 2094. All reserves of energy have been exhausted and the people of the Earth have had to resort to a new source of power — Zydium. This is an element twice as heavy as uranium and can only be found deep in the heart of Planet 10. Every year a brave space pilot is sent to 10 to fly through the dangerous cave system and collect a supply of Zydium crystals — which, strangely, float weightless in the caverns —



WE FLIGHT

before teleporting them to Earth or Mars.

This year you, as an ace pilot from the C&VG space fleet, have been chosen for the task. You have negotiated the caverns, collected the crystals and are making your way back to the surface.

Suddenly all the alarms that can go off in your ship do just that. Lights are flashing, bells ringing, and beepers beeping. The automatic navigation system cuts out, the power control system explodes in a mass of sparks, and every other system apart from life support also cuts out. Your ship is careering through the caverns at breakneck speed — and all

you can do is manoeuvre around the rocky outcrops and hope for the best!

Your ship only has enough fuel for 10 seconds more flight time. You can recharge your engines by flying through the floating patches of Zydonium crystals but you must have quick reactions to steer your way into the crystals and avoid the very solid cavern walls. How long can you survive?

The ship is controlled using the 'A' key for up and 'Z' for down. The distance you have travelled and how much fuel you have left will be displayed at the bottom of the screen. Your fuel does not start run-

ning out until your score reaches 40.

The walls of the cave will never quite close up but long diagonal passageways are common. These may seem impossible to fly through but all the caverns are navigable. A score of over 2,000 puts you in the space ace class!

Variables

F%—distance travelled.

H%—high score.

Y%—counter for position of red stars.

L—used in delay loops.

X—vertical position of ship.

DOWN—position of cave floor.

UP—position of cave ceiling.

AS—used for input of movement.

Sinclair ZX Spectrum

**16K or 48K RAM...
full-size moving-
key keyboard...
colour and sound...
high-resolution
graphics...**

**From only
£125!**



First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power— personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can upgrade later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £80.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer—available now—is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232C/network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour—8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound—BEEP command with variable pitch and duration.
- Massive RAM—16K or 48K.
- Full-size moving-key keyboard—all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution—256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set—with upper- and lower-case characters.
- Teletext-compatible—user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE—16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC—incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum

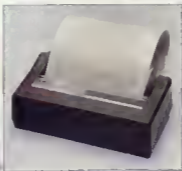


The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set—including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.



The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

The transtar rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £60.



ZX Spectrum software on cassettes – available now

The first 21 software cassettes are now available directly from Sinclair. Produced by ICL and Psion, subjects include games, education, and business/household management. Galactic Invasion, Flight Simulation, Chess, History, Inventions, VU-CALC, VU-3D.

47 programs in all. There's something for everyone, and they all make full use of the Spectrum's colour, sound and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

RS232/network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

sinclair

Sinclair Research Ltd, Stanhope Road,
Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

How to order your ZX Spectrum

BY PHONE—Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST—use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard,

Access or Trustcard.

EITHER WAY—please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt—and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum—16K RAM version	100	125.00	
	Sinclair ZX Spectrum—48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
				Total £

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £

*Please charge to my Access/Barclaycard/Trustcard account no

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name Mr/Mrs/Miss

Address

CV6961

FREEPOST—no stamp needed. Prices apply to UK only. Export prices on application.



GALAXIANS

BY CRAIG FISHER

From out of the deepest recesses of space comes a convoy of aliens bent on destruction — your destruction! Can you halt their determined advance?

This is a version of arcade Galaxians, complete with those nasty swooping craft which dive down at you from the sides. To make scoring harder in this version you can only shoot these diving aliens — and not the ones in the convoy.

Key '1' moves your laser base left, key '3' right. Use '0' to fire. The high score so far, claimed by the author, is 4100. Can you do better?

TABLE OF VARIABLES

Alien 1:

- H: Horizontal position
- AS: Character(s)
- ID: Direction (-1 for left; 1 for right)
- OH: Previous horizontal pos. of alien.

Alien 2:

- L: horizontal position
- BS: Character(s)
- IDL: Direction (see above)
- OL: previous horizontal pos. of alien.
- A: High score
- s: Current score
- Y: Horizontal pos. of convoy.
- D: Direction of convoy (see above)
- P: Position of laser base.
- V: FOR NEXT loop: height of aliens.
- W: Current wave No.

WS: Flays string: shows No. of wave s on screen — 51.

DT: Temporary direction variable.

CS: Convoy character string.

RUNS ON A SPECTRUM IN 16K

```

1 REM
2 REM
3 REM SPECTRUM GALAXIANS
4 REM © C.D. Fisher 8/1982
5 REM
6 REM
7 REM
8 REM
9 REM
10 BORDER 0 PAPER 0 INK 7: C
-5
11 PRINT AT 10,10, FLASH 1, "PL
12     BEEP 1,"
13     GO SUB 1000
14     GO SUB 5000
15     RANDOMIZE
16     LET S=0
17     LET L=0
18     LET W$=""
19     LET D=1
20     LET U=2
21     LET G$=""
22     OP OP OP OP OP OP OP
23     OP OP OP OP OP OP OP
24
25 LET P=8
26 LET V=2
27 FOR I=50 TO 2 STEP -3: IF 9
28 $ (I)= " " THEN NEXT I
29 LET H=1-19*(I/19)-19*(I/38)
30
31 LET G$(I-1 TO I+1)=" "
32 IF I<4 THEN GO TO 59
33 LET I=(H/16)-(H/16)
34 FOR X=50 TO 2 STEP -3: IF 9
35 $ (X)= " " THEN NEXT X
36 LET L=(X-19*(X/19)-19*(X/38))
37
38 LET G$(X-1 TO X+1)=" "
39 LET I=(H/16)-(H/16)
40 LET O=H
41 LET B$="GH"
42 LET A$="GH"
43
44 PRINT INVERSE 1, AT 1,1: "1UP
45 TAB 15, "HIGH SCORE, "
46
47 REM Main Loop
48
49 FOR V=3 TO 19
50 PRINT AT V-1, O, " "; AT V-1
51
52 PRINT INVERSE 1, AT 1,5, S: I
53 NVERSE 0, INK 4, AT 3, V, S( TO 21
54 ) TAB Y, S(122 TO 38), TAB Y, G$(39
55 TO )
56 PRINT INK 3, AT V, H, A$, AT V,
57 L, B$
58 LET Y=Y+G: IF Y<2 OR Y>10 T
59 HEN LET d=d
60 IF INKEY$="0" THEN INK 2: P
61 LOT P+5+3, 15, DRAW 0, 130 BEEP 1,
62 0,5, DRAW OVER 1,0, -130 INK 7
63
64 IF INKEY$="0" AND ((P=H OR
65 P=(I+1) AND A$<X) OR ((P=L OR
66 P=(L+1) AND B$<X)) THEN GO SUB
67 348
68
69 BEEP , 01 -14
70 IF AND: S THEN GO SUB B00
71
72 LET P=P+2*(INKEY$="3") AND
73 P<29) -2*(INKEY$="1") AND P>2)
74
75 LET O=H, LET O=L
76 LET d=(INT (RAND*2)+1)*d
77 LET h=h+d
78 IF h>30 OR h<0 THEN LET d=
79 -1 LET h=30*(I/16) GO TO 150
80 LET d=(INT (RAND*2)+1)*d
81 LET l=l+d
82 IF (I>30 OR I<0 THEN LET d=1
83 S=-d LET l=30*(I/16) GO TO 15
84
85 LET I=(I+1*(I<2))-I*(I>30)
86 IF A$="" AND B$="" THEN GO
87 TO 176
88 PLOT INVERSE 1,0,15, DRAW I
89 NVERSE 1,25,0
90 PRINT AT 21,0 W$ ( TO M)
91 NEXT V
92 IF A$="GH" OR B$="GH" THEN
93 GO SUB 600
94
95 IF X<6 AND I<6 AND A$="" AN
96 D B$="" THEN LET M=M+1, LET S=S+
97 50, PRINT AT 1,9, FLASH 1, "BONUS
98 PAUSE 250, PAUSE 0 GO TO 25
99 IF ABS (P-1) < 1 AND ABS (P
100 +1) > 1 THEN GO TO 43
101 IF ABS (P+1-1) < 1 AND B$=""

```

```

") OR ABS (P+1-1) < 1 AND A$=""
102 THEN GO TO 40
103 PRINT AT 20, P, FLASH 1, "B"
104 PRINT AT 10, 10, FLASH 1, "SC
105
106 S BEEP 1,20
107 IF A$<X THEN LET A=S
108 LET S=0
109 LET I=3
110 PAUSE 0 PAUSE 0
111 GO TO 20
112
113 REM Subroutine to Explode
114 REM Appropriate Alien.
115
116 LET S=S+10
117 BEEP , 5,35
118 IF P=H+1 OR P=L THEN PRINT
119 AT V, H, "001", LET A$=""
120 IF P=L OR P=H THEN PRINT
121 AT V, L, "001", LET B$=""
122 RETURN
123
124 REM Subroutine to replace
125 REM aliens in "pool" if
126 REM they escape.
127
128 IF A$="GH" THEN LET G$(X TO
129 X+1)=""
130 IF B$="GH" THEN LET G$(I TO
131 I+1)=""
132 RETURN
133
134 REM Subroutine to fire
135 REM aliens missiles.
136
137 LET C$="h" (INT (RAND*2)+1)
138 IF C$="h" AND A$="" OR C$=
139 "AND B$="" THEN RETURN
140
141 PLOT VAL C$*8+0, (21-V)*8-2
142 DRAW VAL C$*8+8-PEEK 23677,
143 16-PEEK 23678
144
145 IF VAL C$=P OR VAL C$=L+P T
146 HEN GO TO 195
147 DRAW OVER 1,0, (19-V)*8-2
148 RETURN
149
150 REM Subroutine to set up
151 REM user-defined chars.
152
153 FOR X=1 TO 7, READ P$ FOR
154 1000 TO 1007
155 READ R: POKE USA P$+H, R
156 NEXT X: NEXT 4
157 DATA "0", 2, 2, 71, 125, 7, 31, 59
158
159 DATA "p", 64, 64, 226, 190, 224,
160 0, 226, 84, 64
161 DATA "g", 49, 56, 31, 7, 125, 71
162
163 DATA "h", 140, 220, 248, 224, 19
164 0, 226, 84, 64
165 DATA "b", 24, 60, 153, 169, 255,
166 255, 219, 128
167 DATA "q", 145, 82, 0, 3, 192, 0, 7
168 1, 145
169 DATA "f", 128, 192, 224, 192, 12
170 8, 128, 128, 128
171 RETURN
172
173 REM Subroutine to print
174 REM instructions & scores
175
176 CLS
177 PRINT TAB 10, "SPECTRUM GALA
178 XIANS" by C. Fisher.
179 PRINT "The object of thi
180 s game is to
181 "shoot as many of the
182 diving, firing aliens as you
183 can
184 PRINT "so getting a high sc
185 ore."
186 PRINT "TAB 5, FLASH 1, "THE
187 CONTROLS: "
188 PRINT "key '1' moves you
189 left"
190 PRINT " " "3" "
191 right"
192 PRINT " " "0" fires your
193 missiles"
194 PRINT "PAPER 2, FLASH 1: "
195 GOOD LUCK !! "
196 INPUT " (press 'enter' to be
197 gin) LINE 25
198 RETURN

```

Here's a really explosive board game. You'll have to be really careful not to start off a chain reaction which will literally wipe you out!

It's a two player game based on a board game called Explosion — difficult to play on a board but tailor made for the TRS-80. You are presented with a 6x6 grid and each player in turn introduces one of his counters either onto an empty square or a square occupied

by one or more of his own counters. However, each square has a point at which critical mass is reached and fission occurs. Corner squares explode when two counters are on them, side squares explode when containing three counters, central squares go up when four counters occupy their space.

When an explosion occurs the counters on the exploding square are distributed

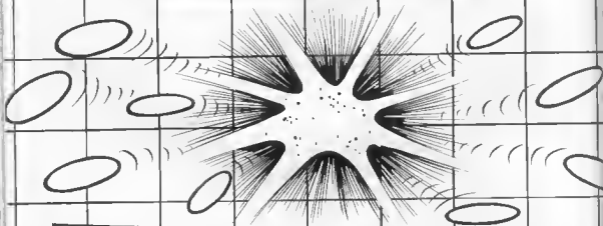
across the board. Any enemy counters on the latter square are captured and become counters belonging to the mover. Should receiving squares attain critical mass further explosions will result.

Any player having no counters left at the end of his opponent's move is the loser. The game has some interesting sound effects which can be enjoyed via the cassette port.

RUNS ON A TRS-80 IN 3K

BY PETER MILLEN

CRITICAL MASS



```

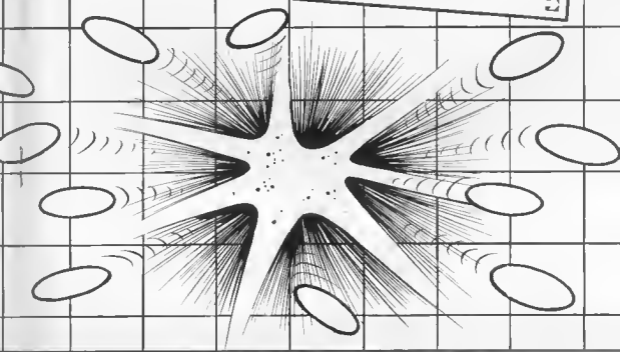
10 CLEAR200:CLS:FORLX=1TO16:PRINTAB(LX)CHR$(23)"CRITICAL MASS":NEXTLX:GOSUB840
15 CLS:PRINT:PRINT:PRINT:PRINTCHR$(23)"DO YOU WANT INSTRUCTIONS - Y/N?"
17 A$=INKEY$:IFA$=""THEN1ELSEIFA$="Y"THENGOSUB1000
20 DIMA(6,6),L(6,6),CA(6,6),PP(6,6):A$(0)=CHR$(183)+CHR$(187):A$(1)=CHR$(174)+C
HR$(157)
30 FORLX=1TO6
40 FORLY=1TO6
50 READCA(LX,LY)
60 NEXTLY:NEXTLX
70 FORLX=1TO6:FORLY=1TO6
80 PP(LX,LY)=193+(LX-1)*10+(LY-1)*128
90 NEXTLY:NEXTLX
95 CLS
100 FORX=15488TO15547
110 FORY=0TO768STEP128
120 POKEX+Y,140
130 NEXTY
140 NEXTX
150 FORX=0TO120STEP20
160 FORY=7TO43
170 SET(X,Y)

```

```

180 NEXT Y
190 NEXT X
200 FOR LX=1 TO 6
210 PRINT@ (69+(LX-1)*10), LX; :PRINT@ (253+(LX-1)*128), LX;
220 NEXT LX
230 X=0:GOTO 500
300 FOR LX=1 TO 5
310 PRINT@ PP(TX, TY), STRING$(8, 191); :FORTD=1 TO 50: NEXT TD: XX=USR(100)
320 PRINT@ PP(TX, TY), STRING$(8, 128); :FORTD=1 TO 50: NEXT TD
330 NEXT LX
340 MA(TX, TY)=MA(TX, TY)-CA(TX, TY)
350 IF MA(TX, TY) THEN PRINT@ PP(TX, TY), MA(TX, TY); :PRINT@ PP(TX, TY)+4, A$(X); ELSE (TX, TY)=0
360 EY=TY-1: IF EY=0 THEN GOTO 370 ELSE GOSUB 930
370 EX=TX-1: IF EX=0 THEN GOTO 380 ELSE GOSUB 940
380 EY=TY+1: IF EY=6 THEN GOTO 390 ELSE GOSUB 930
390 EX=TX+1: IF EX=6 THEN RETURN ELSE GOSUB 940: RETURN
400 FB=0
410 FORTX=1 TO 6
420 FORTY=1 TO 6
430 IF MA(TX, TY)=CA(TX, TY) THEN FB=1: GOSUB 300
440 NEXT TY
450 NEXT TX
460 GOSUB 700: IF FB=1 THEN GOTO 400 ELSE GOTO 500
500 X=1-X
510 PRINT@ 5, "PLAYER": A$(X); " WHICH COLUMN?"; : GOSUB 560
515 PRINT@ 5, STRING$(24, 128); :PRINT@ 30, "WHICH ROW?"; : GOSUB 970: PRINT@ 30, STRING$(20, 128);
520 IF L(TX, TY) (X+1 AND L(TX, TY) THEN PRINT@ 5, "ILLEGAL MOVE."; :FORTD=1 TO 50: NEXT TD: GOTO 510
530 MA(TX, TY)=MA(TX, TY)+1: IF L(TX, TY)=0 THEN L(TX, TY)=X+1
540 PRINT@ PP(TX, TY), MA(TX, TY); :PRINT@ PP(TX, TY)+4, A$(X);
550 IF MA(TX, TY)=CA(TX, TY) THEN GOSUB 300: GOTO 400 ELSE GOTO 500
700 VB=0
710 FOR LX=1 TO 6
720 FOR LY=1 TO 6
730 IF L(LX, LY)=(1-X)+1 THEN VB=1
740 NEXT LY
750 NEXT LX

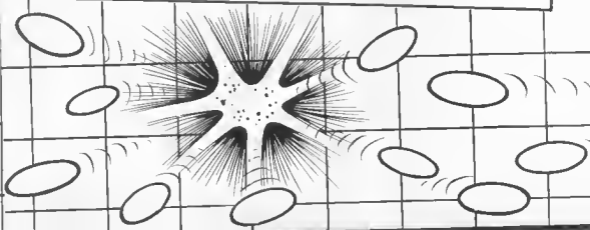
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760 IFVG=1THENRETURN
770 FORLX=1TO5
780 PRINT65,"WIN FOR PLAYER ";A$(X);":!":FORTD=1TO50:NEXTTD
785 FORYY=1TO50:XX=USR(YY):NEXTYY
790 PRINT65,"
795 NEXTLY
800 CLS
810 PRINTCHR$(23)"WANT TO PLAY AGAIN (Y/N) ?"
820 A$=INKEY$:IF A$=""THEN820
830 IF A$="Y"THENFORLX=1TO6:FORLY=1TO6:MA(LX,LY)=0:L(LX,LY)=0:NEXTLY:NEXTLX:GOTO9
835 REM ** SOUND EFFECT SUBROUTINE **
840 POKE16553,255
850 SF$=STRING$(24,191)
860 I=VARPTR(SF$):JJ=PEEK(I+2)*256+PEEK(I+1):IFJJ:32767THENJJ=-1*(65536-JJ)
870 FORPS=JJTOJJ+23:READD:POKEPS,D:NEXTPS
880 POKE16526,PEEK(I+1):POKE16527,PEEK(I+2):RETURN
890 DATA205,127,10,14,60,65,62,01,211,255,16,254,65,60,211,255,16,254,43,124,181
,32,238,201
900 DATA2,3,3,3,2,3,4,4,4,4,3,3,4,4,4,4,3
910 DATA3,4,4,4,4,3,3,4,4,4,3,2,3,3,3,2
920 L(TX,EY)=X+1:MA(TX,EY)=MA(TX,EY)+1:PRINT@P(TX,EY),MA(TX,EY):PRINT@P(TX,EY
)+4,A$(X):RETURN
940 L(EX,TY)=X+1:MA(EX,TY)=MA(EX,TY)+1:PRINT@P(EX,TY),MA(EX,TY):PRINT@P(EX,TY
)+4,A$(X):RETURN
960 I$=INKEY$:IF I$=""THEN960ELSEIFVAL(I$)(10RVAL(I$))6THEN960ELSETX=VAL(I$):RETU
RN
970 I$=INKEY$:IF I$=""THEN970ELSEIFVAL(I$)(10RVAL(I$))6THEN970ELSETY=VAL(I$):RETU
RN
1000 CLS:PRINTTAB(30)"CRITICAL MASS":PRINT
1010 PRINT"THIS IS A GAME FOR TWO PLAYERS ON A 6 X 6 BOARD."
1020 PRINT"IN HIS TURN, EACH PLAYER INTRODUCES ONE OF HIS"
1030 PRINT"PIECES ON TO:"
1040 PRINT"(1) AN EMPTY SPACE, OR"
1050 PRINT"(2) A SQUARE WITH ONE OR MORE OF HIS PIECES":PRINT
1060 PRINT"HOWEVER, EACH SQUARE HAS A POINT AT WHICH CRITICAL"
1070 PRINT"MASS IS REACHED AND A FISSION EXPLOSION OCCURS"
1080 PRINT"CORNER SQUARES EXPLODE WHEN CONTAINING 2 PIECES,"
1090 PRINT"SIDE SQUARES EXPLODE WHEN CONTAINING 3 PIECES,"
1100 PRINT"CENTRAL SQUARES EXPLODE WHEN CONTAINING 4 PIECES."
1110 PRINT:PRINT"HIT ANY KEY TO CONTINUE"
1120 A$=INKEY$:IF A$=""THEN1120ELSECLS
1130 PRINT"WHEN AN EXPLOSION OCCURS THE PIECES ON THE EXPLODING"
1140 PRINT"SQUARE ARE DISTRIBUTED TO ITS NEIGHBOURS. ANY ENEMY"
1150 PRINT"PIECES ON THE LATTER SQUARE ARE CAPTURED AND BECOME"
1160 PRINT"PIECES OF THE MOVER. SHOULD ((RECEIVING)) SQUARES"
1170 PRINT"ATTAIN CRITICAL MASS THEN FURTHER EXPLOSIONS RESULT"
1180 PRINT:PRINT"ANY PLAYER HAVING NO PIECES LEFT AT THE END OF THE"
1190 PRINT"OPPONENT'S TURN LOSES.":PRINT
1200 PRINT"THE GAME CONTAINS SOUND EFFECTS WHICH MAY BE ENJOYED(?)"
1210 PRINT"VIA THE CASSETTE PORT."
1220 PRINT"PRESS ANY KEY TO COMMENCE"
1230 A$=INKEY$:IF A$=""THEN1230ELSE RETURN
1250 END

```



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MZ LUDO

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All the normal rules of the board game apply here — and the computer will not allow you to cheat!

There's a nice graphic dice to control all the moves and you simply use the 'Space' key to get it rolling.

Remember if you manage to land on an opponent's counter — represented on the Sharp board by graphic characters — it sends him right back where he started from — a very satisfying move!

For those who can't remember the childhood tactics of the game, it's all a question of deciding which piece to push along in front.

I tend towards a one-out, all-out strategy but will let you develop your own tactics to

get your four counters home fastest.

You will need to get an exact move to finish on, so there's a little luck involved at the death but you'll just have to trust your Sharp not to cheat on its dice throws.

It's during games like this that you really notice those Shift-y keys the Sharp has!!!

BY FRANK ROONEY

```

100 M$="_B0CDEFGBA" : DIMA(U), E(U), C(4), D(4), K(4), L(4), F(4), B(4), N(4)
110 P$=53248 : S=71 : U=46 : DIMA(U), E(U), C(4), D(4), K(4), L(4), F(4), B(4), N(4)
120 FORB=1 TO U : READA(B) : NEXTB : FORF=1 TO U : READF(F) : NEXTF
130 FORC=1 TO 4 : READC(C) : NEXTC : FORD=1 TO 4 : READD(D) : NEXTD : GOTD170
140 POKE4466, T : PRINT TAB(26); SPC(13); PRINT "B"; TAB(26); SPC(13)
150 POKE4466, T : PRINT TAB(26); SPC(13); PRINT "B"; TAB(26); SPC(13)
160 POKE4466, 10 : FORI=1 TO 5 : PRINT TAB(30); SPC(6); NEXTI : RETURN
170 FORD=1 TO 4 : IF (D)=D : B(D)=D : NEXTD
180 PRINT "*****" : PRINT "How many players ? (1 or 2)"
190 GETPL : IF (PL<1) OR (PL>2) THEN 190
200 PRINT "*****" : IF PL=2 THEN PRINT "Player 1" : PRINT "*****"
210 POKE4466, 3 : INPUT "Enter your name: "; A$ : LA=LEN(A$) : IFLA<14 THEN 230
220 GOSUB 290 : GOTD210
230 IFLA=1 THEN 270
240 PRINT "*****" : PRINT "Player 2" : PRINT "*****"
250 POKE4466, 9 : INPUT "Enter your name: "; B$ : LB=LEN(B$) : IFLB<14 THEN 270
260 GOSUB 290 : GOTD250
270 PRINT "*****" : PRINT "Press 'SPACE' to throw the dice."
280 PRINT "*****" : PRINT "If you throw a 6 you get another go." : FORI=0 TO 500 : NEXTI : GOTD300
290 PRINT "*****" : PRINT "Go too long !!!" : SPC(28) : FORI=0 TO 1000 : NEXTI : PRINT "*****" : SPC(39) : RETURN
300 PRINT "*****" : PRINT "Press any key to start" : PRINT "*****"
310 GETX$ : IF X$="" THEN 310
320 T=6 : TT=17 : GOSUB 1320 : G=INT (RND(1)*2+1) : IF G=2 THEN 550
330 IF G=2 THEN 560
340 REM ***** PLAYER 1 *****
350 V=0 : T=6 : TT=17 : GOSUB 140 : GOSUB 770
360 FORD=1 TO 4 : IF (B(D)+X) > 0 THEN NEXTD : GOSUB 890 : GOTD480
370 M=PEEK (P+A(B(D)+X))
380 IF (M=67) + (M=108) + (M=208) + (M=74) THEN NEXTD : GOSUB 890 : GOTD480
390 GOSUB 820
400 IF (B(D)+X) > 0 THEN GOSUB 850 : GOTD380
410 M=PEEK (P+A(B(D)+X)) : FORJ=1 TO 4 : IF M=K(J) THEN GOSUB 850 : GOTD380
420 NEXTJ
430 FORC=1 TO 4 : IF M=L(C) THEN 520
440 NEXTC
450 USR(62) : GOSUB 500
460 FORB=1 TO 4 : FORJ=1 TO 4 : IF PEEK (P+A(B)) = K(J) THEN V=V+1

```

RUNS ON A SHARP MZ-80K IN 32K



```

460 NEXTJ:NEXTB
470 IFV>3THEN910
480 IFX=6THEN340
490 G=2:GOTO550
500 POKEP+A(B(D)),O:B(D)=B(D)+X:FORZ=0TO9:
    POKEP+A(B(D)),O:FORI=0TO50:NEXTI
510 POKEP+A(B(D)),Y(D):FORI=0TO50:NEXTI:NEXTZ:RETURN
520 MUSIC"DBDG3":GOSUB500
530 FORB=1TO4:IFPEEK(P+E(B))=0THENPOKEP+E(B),M:F(C)=B:GOTO450
540 NEXTB
550 IFPL=1THEN930
559 REM ***** PLAYER 2 *****
560 W=0:T=17:TT=6:GOSUB140:GOSUB770
570 FORD=1TO4:IF(F(D)+X)>0THENNEXTD:GOSUB890:GOTO700
580 N=PEEK(P+E(F(D)+X))
590 IF(N=65)+(N=B3)+(N=6B)+(N=70)THENNEXTD:GOSUB890:GOTO700
600 GOSUB820
610 IF(F(D)+X)>0THENGOSUB850:GOTO600
620 N=PEEK(P+E(F(D)+X)):FORJ=1TO4:IFN=L(J)THENGOSUB850:GOTO600
630 NEXTJ
640 FORD=1TO4:IFN=K(C)THEN740
650 NEXTC
660 USR(62):GOSUB720
670 FORD=43TO4:FORJ=1TO4:IFPEEK(P+E(F))=L(J)THENW=W+1
680 NEXTJ:NEXTF
690 IFW>3THEN910
700 IFX=6THEN560
710 G=1:GOTO340
720 POKEP+E(F(D)),O:F(D)=F(D)+X:FORZ=0TO9:POKEP+E(F(D)),O:FORI=0TO50:NEXTI
730 POKEP+E(F(D)),L(D):FORI=0TO50:NEXTI:NEXTZ:RETURN
740 MUSIC"DBDG3":GOSUB720
750 FORD=1TO4:IFPEEK(P+A(F))=0THENPOKEP+A(F),N:B(C)=F:GOTO670
760 NEXTF
770 POKE4466,T:PRINTTAB(30):"THROW"
780 FORI=0TO9:NEXTI:PRINT"8":TAB(30):SPC(5)
790 GETX:IFX=" "THEN770
800 GOTO1180
810 RETURN
820 POKE4466,T:PRINTTAB(26):"Which piece?"
830 GETD:IF(D<1)+(D>4)THEN830
840 PRINTTAB(31):"8":D:RETURN
850 POKE4466,T:PRINTTAB(26):SPC(13):MUSIC"G1_DG_DG_D":FORZ=0TO9
860 POKE4466,T:PRINTTAB(28):"ILLEGAL":FORI=0TO25:NEXTI
870 PRINT"8":TAB(26):SPC(13):FORI=0TO25:NEXTI:NEXTZ
880 PRINT"8":TAB(26):SPC(13):RETURN
890 MUSIC"G1_DG_DG_D":POKE4466,T:PRINTTAB(26):"You can't go!"
900 FORZ=1TO500:NEXTZ:RETURN
910 MUSICM:M=8:POKE4466,T:PRINTTAB(26):"YOU WIN!":GOTO1120
920 FORZ=0TO500:NEXTZ:RETURN
929 REM ***** COMPUTER *****
930 W=0:T=17:TT=6:GOSUB140:GOTO1180
940 FORD=1TO4:IF(F(D)+X)<0THENN(D)=PEEK(P+E(F(D)+X))
950 FORD=1TO4:IFN(D)=K(C)THEN1060
960 NEXTC:NEXTD
970 FORD=1TO4:IF(F(D)+X)=<U)&(N(D)=0)THENUSR(62):GOSUB1040:GOTO990

```

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The programmer says it will take on average three weeks to solve! But unlike normal adventures, this one can be saved to tape, thus allowing you to load the saved data, and so resume at the same place and time and with the same objects as you previously left the game.

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80 NEXT D:GOTO1100
90 FORF=31TO4:FORDD=1TO4:
  IFPEEK (P+E (F))=L (DD) THENW=W+1
1000 NEXTDD:NEXTF
010 IFW>3THEN1110
020 IFX=6THEN930
030 G=1:GOTO340
040 POKEP+E (F (D)),O:F (D)=F (D)+X:FORZ=0TO9:POKEP+E (F (D)),O:FORI=0TO50:NEXTI
050 POKEP+E (F (D)),L (D):FORI=0TO50:NEXTI:NEXTZ:RETURN
060 MUSIC%="1B7DB5":GOSUB1040
070 FORB=1TO4:IFPEEK (P+A (B))=0THENFPOKEP+A (B),N (D):B (C)=B:GOTO990
080 NEXTB
090 MUSIC"G1-DG-DG-D"
100 POKE4466,17:PRINTTAB (27);"Can't go !";FORZ=1TO1500:NEXTZ:GOTO1020
110 MUSICM%="M:M:S:POKE4466,17:PRINTTAB (26);" I WIN !!!"
120 FORZ=1TO5000:NEXTZ
130 PRINT"#####Do you want another game (Y or N) ?"
140 DETX%:IFX%="Y"THEN1140
150 IFX%="Y"THEN170
160 IFX%="N"THENPRINT"@" :END
170 GOTO1140
179 REM ##### DICE #####
180 H=0:FORX=1TO6:GOSUB1200:NEXTX
190 H=1:X=INT (RND (1)*6+1)
200 ONXGOTO1210,1220,1230,1240,1250,1270
210 GOSUB140:POKEP+512,S:GOTO1290
220 GOSUB160:POKEP+473,S:POKEP+551,S:GOTO1290
230 GOSUB160:POKEP+434,S:POKEP+512,S:POKEP+590,S:GOTO1290
240 GOSUB160:POKEP+430,S:POKEP+434,S:POKEP+590,S:POKEP+594,S:GOTO1290
250 GOSUB160
260 POKEP+430,S:POKEP+434,S:POKEP+512,S:POKEP+590,S:POKEP+594,S:GOTO1290
270 GOSUB160:POKEP+430,S:POKEP+434,S:POKEP+510,S:POKEP+514,S:POKEP+590,S
280 POKEP+594,S:GOTO1290
290 IFH=0THENRETURN
300 IF (PL=1)*(G=2) THEN940
310 GOTO810
320 PRINT"@";
330
340 FORI=1TOLA-1:PRINT" ";TAB (32-INT (LA/2));A%
350 FORI=1TOLA-1:PRINT" ";TAB (32-INT (LA/2));
360 PRINT"
370 PRINT"
380 PRINT"
390 PRINT"
400 PRINT"
410 PRINT"
420 PRINT"
430 PRINT"
440 PRINT"
450 PRINT"
460 PRINT"
470 PRINT"
480 PRINT"
490 PRINT"
500 PRINT"
510 PRINT"
520 PRINT"
530 PRINT"
540 PRINT"
550 PRINT"
560 PRINT"
570 PRINT"
580 PRINT"
590 PRINT"
600 IFPL=1THENPRINTTAB (16);"YOU":GOTO1620
610 PRINTTAB (14);"PLAYER 1"
620 POKE4466,19
630 IFPL=2THENPRINTTAB (4);"PLAYER 2":PRINT"@";TAB (32-INT (LB/2));B%
640 IFPL=2THENPRINTTAB (32-INT (LB/2));:FORI=1TOLB-1:PRINT" ";:NEXTI:PRINT"-"
650 IFPL=1THENPRINT"#####COMPUTER:PRINTTAB (28);"COMPUTER#####"
660 RETURN
670 DATA207,287,367,369,371,291,211,131,51,49,47,45,43,41,121,201,281,361
680 DATA441,521,611,681,761,841,921,923,925,927,829,931,933,935,937,939,941
690 DATA777,977,612,713,622,843,663,461,459,457,455
700 DATA777,977,612,713,622,843,663,461,459,457,455
710 DATA623,543,463,383,303,223,143,63,61,59,57,55,53,51,49,47,45,43,41,121
720 DATA201,281,361,441,521,523,525,527,529
730 DATA67,108,208,74,65,83,68,70

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```

100 REM ***TX SOFTWARE***
110 REM R.MATTHEWS (1982)
120 REM *****
130 DIM A(32) A(1),A(2),A(3),A(31),A(30),A(31),A(32)=25
140 RANDOMIZE CALL MAGNIFY(3):: CALL COLOR(9,2,6,11,5,13,1,1)
145 CALL SCREEN(6) CALL INSTRUCTIONS(PN)
150 A1$="8000FFFFF3F70"&RPT$( "0",22)&"CFEFEF8"
160 A2$="00011F3F3F0F7FFFFF0557F00000000E0FFE0E000EFFFFEFEE5454FC"
170 A3$="FFFF"
180 A4$=RPT$( "0",16)&"293B7FFFFF7F7F3F"&RPT$( "0",16)&"80E0F5FEFFFFFFF1C"
190 A5$="293B7FFFFF7F7F3F0F7030303030F7F80E0F5F5FFFFF0CFCE0C0C0E0F0FF"
200 A6$="34599D45B5AC7CBF7EFF7EFFCA425149"
210 A7$="E0404040"
220 A8$="7F7F66667F7F6666"
230 A9$="FEFE6666FEFE6666"
235 CALL CHAR(96,A1$,108,A2$,112,A3$,116,A4$,120,A5$)
236 CALL CHAR(124,A6$,104,A7$,132,A8$,120,A9$)
240 CALL CLEAR FOR J=4 TO 20 STEP 2 :: NT=INT(RND*10)+1
245 CALL VCHAR(24-NT,J,132,HT)::CALL VCHAR(24-NT,J+1,128,HT)
250 A(J),A(J+1)=24-NT :: NEXT J :: CALL COLOR(13,2,6):: CALL NCHAR(24,1,112,32)
260 CALL SPRITE(#2,96,5,10,1,0,35)
265 CALL SPRITE(#4,108,16,178,100,0,5,#5,108,11,170,28,0,5)
266 CALL SPRITE(#6,108,12,170,100,0,5)
270 CALL KEY(1,K,S) IF S THEN GOSUB 280 ELSE SC=SC-PN
271 GOTO 270
280 CALL POSITION(#2,X,Y)::CALL LOCATE(#2,X+1,Y)
285 CALL SPRITE(#3,104,16,X,Y,50,0)::CL=INT(Y/8.01)+1 X1=INT(X/8.01)+3
290 IF CL<4 OR CL>30 THEN 330
300 CALL COINC(ALL,C) IF C THEN 360 ELSE CALL POSITION(#3,X,Y)
305 IF X>184 THEN 330 ELSE RW=INT(X/8.01)+1 IF RW<CL THEN 300
310 CALL SPITE(#3,124,2,X,Y,-20,0)::CALL SOUND(-200,-5,0)
315 CALL VCHAR(RW-2,CL,32,3)::ACCL=RW+1
320 SC=SC+10 DISPLAY AT(1,1) SC
330 CALL DELSPRITE(#3) IF X1<16 THEN RETURN
340 FOR J=4 TO 29 IF A(J)<X1 THEN 300
350 NEXT J RETURN
360 CALL SPRITE(#3,116,16,176,Y,0,0)::CALL SOUND(-500,-5,0)
365 SC=SC+(<75-RW)*4 DISPLAY AT(1,1) SC
370 CALL PATTERN(#3,128) IF RND<.5 THEN 360 ELSE 330
380 CALL SOUND(-4000,-3,0,400,8)
385 FOR DEL=1 TO 1500 :: NEXT DEL RUN
390 STOP
400 SUB INSTRUCTIONS(PN) CALL CLEAR
410 DISPLAY AT(1,0) "TARGET" DISPLAY AT(2,8) "=====
420 DISPLAY AT(5,1) "USE ANY KEY TO DROP BOMB."
430 DISPLAY AT(9,1) "CHOOSE OPTION PLEASE"
440 DISPLAY AT(13,1) "EASY OPTION",TAB(26);"(1)"
450 DISPLAY AT(15,1) "HARD OPTION"
460 DISPLAY AT(16,1) "(NEGATIVE SCORING)",TAB(26);"(2)"
470 CALL KEY (0,KY,ST)::CALL SOUND(-20,900,20) IF ST=0 THEN 470
480 IF KY=49 OR KY=50 THEN PN=KY-49 ELSE 470
500 SUBEND
600 REM *****
601 REM LINES 150 TO 210 DEFINE CHARACTERS .. EXPERIMENT HERE!
610 REM A1$.. PLANE
620 REM A2$.. TANK
630 REM A3$.. ROAD
640 REM A4$,A5$,A6$.. EXPLOSIONS
650 REM A7$.. BOMB
660 REM A8$,A9$..BUILDINGS
670 REM *****
680 REM SPRITE #2..PLANE
690 REM SPRITES #4,#5 #6..TANKS
700 REM SPRITE #3..BOMB
710 REM *****
720 REM INCREASE DIFFICULTY LEVEL BY INCREASING SPEED OF SPRITE(#2)
725 REM ALSO HEIGHT OF BUILDINGS CAN BE CHANGED IN LINE 240
730 REM TANKS CAN BE SPEEDED UP OR SLOWED DOWN IN LINES 265 AND 266
735 REM APPAY 'A)' KEEPS CHECK OF HEIGHT OF EACH BUILDING
740 REM AS AN ALTERNATIVE TO 'RUN' IN 385 YOU CAN CHECK FOR HIGHEST SCORE TO
750 REM DATE ..HIGHEST=MAX(SC,HIGHEST) AND GOTO 240 . HIGHEST SCORE CAN THEN
760 REM BE DISPLAYED
800 REM ALL REMS MAY BE DELETED
900 END
READY.

```

TARGET

RUNS ON A TI 99/4A IN 16K BY R. MATTHEWS

You are the pilot of a jet fighter on a kamikaze mission. Your task is to bomb a city occupied by enemy troops and cause as much destruction as possible before your jet crashes into the flaming ruins. Enemy tanks are racing through the city streets and these must also be destroyed before

they manage to find shelter. They can only be hit when your bombs have cleared gaps in the buildings.

But all the time you are blasting away at the city below your jet is losing altitude — and it's only a matter of time before it crashes — so you have to move fast to complete

your mission.

Program notes: A15 to A95 define character shapes. Mikeying will not affect the running of the program — but it will produce some odd shapes! A variable A(31) is defined twice in line 130. This is unnecessary and one of them may be deleted before copying.



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PUZZLING

BY TERRY O'NEILL

CAN YOU STEM THE ALIEN TIDE?

If all the arcade aliens were joined tentacle to antenna the line would stretch very nearly from Hazelbury Plunknett to furthest Wollumboola-wonga.

The link can be completed provided you and your trusty laser can give the deep fried treatment to these, the latest misguided monsters who have crossed the Cosmos in the belief that Earth is their new paradise.

The puzzle can be solved by hand and brain right here on the page (may we recommend a piece of thin paper laid on top, so that several attempts can be carried out?) or a program can be written which will achieve the task in the most efficient manner.

To begin: place your gun on any of the firing positions A to F and loose off a shot. This, as in all future firings, will have two effects: One alien lying on that vertical line will be destroyed and that firing position will have its value (shown by the number) reduced by one. Enter the new value in the grid below the firing range and prepare to move.

After each shot you must move your gun the distance in squares equal to its current value. You can move to right or left but must proceed in one direction unless the value of the square would take you beyond the firing range.

In this case you "bounce" back from the end square, as our sample picture shows.

At the end of your move you must fire the laser and reduce the value of that square by 1 even though there may be no aliens to shoot at. You must be sure never to land on a square and reduce its value to zero as you will then be stuck and the rest of the gang will land — with consequences dire to the future of the human race.

True success will only come if you can complete the task in the

Example
of bounce

5



A	B	C	D	E	F
5	6	7	5	4	6

Enter each
new value here

lowest possible number of moves.

Remember this is no easy entanglement with a bunch of alien E.T. wets, but the future of this very Earth is at stake. Realising the gravity of the situation, the editor of this magazine feels prompted to reward three space-war heroes who find the correct solution.

Try a few rough attempts first to work out how the aliens move.

Send your lowest solution to: Space Attack Competition Computer & Video Games, Durrant House, 8, Herbel Hill, London EC1R 5JB, before January 12. The first three out of the hat will win hand-held space invader machines.



If you can beat the Puzzling pages' space invaders, then you could have a chance to tackle invaders on the Galaxy Invader 1000.

Three of Computer Games Ltd's hand-held space invader games are up for grabs for the first three answers with the best solutions out of the hat.

The Galaxy Invader has three skill levels, two colour graphic display and scores up to 999 with extra missile stations for scores over 700.

Makes sure your entry is with us before January 12th 1983.

DEFEAT THIS WORDY HORROR

This relic (right) from the primordial past is in urgent need of taming before it leaves its dark unfathomed cave and starts chewing up fair damsels, post office towers and Clive Sinclair.

To do this, drop one letter from those used in the line above and arrange the remaining letters to form a word or words.

Words, to be valid fodder for our toothsome fiend, must be of three letters or more and must be bold type entries in *Chambers's Twentieth Century Dictionary, Revised Edition*.

Words must not overlap along the line and must be separated by a bar. A word once used must not be repeated on any subsequent line.

Each line scores the total of all the letter values which appear in it. The letter values are shown above the top line. So keeping "I" in is worth extra points.

A bonus can be scored for each word which is of five or more letters and is equal to the length of the word; a five-letter word gains five extra points and so on.

When you have entered the score for each line add on the sum of your bonuses to give the final grand total — the greater that is, the more peaceful the leviathan.



UNSCRAMBLE THE ONMIDOSE

This somewhat bizarre title is a direct indication as to just what is the problem below — dominoes have been scrambled.

Not that the event caused any grief to Ephraim Wheel, rather the opposite.

He was so delighted that his

daughter, Daisy, had managed to arrange her complete set of picture pairs into a six by five rectangle that he quickly drew the layout for posterity.

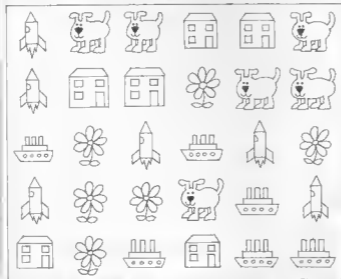
It mattered not that the girl had paid scant regard to the usual rule that adjacent dominoes should have the same picture touching, at a few days over 18 months, it was a miracle to the proud father that geometric genius had manifested itself at so early an age.

Hence, as we have remarked, the quick drawing. Too quick, in fact, as Ephraim has omitted the lines which show the separate dominoes.

It is not too difficult a task to find the unique way in which the cards were laid out, bearing in mind that with 5 different pictures, all the different arrangements of possible pairs are present somewhere.

Can you draw the dividing lines and so complete the picture for Ephraim?

The solutions to these two puzzles and the winners of our November Mestormied competition can be found on page 11 of this issue. Try them before you look out an answer



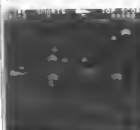


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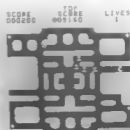


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- ★ The ancient African game of logic. It takes 2 minutes to learn the rules but far longer to master the tactics.
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BY ALAN HIRON

DEALING WITH THE DOUBLE-DUMMY POSER

In my last article I talked about the possibilities of running an exhaustive search to tackle the play in the sort of bridge problem where you can see all four hands — the so-called — or rather misnamed — double-dummy problem.

As I had suggested, if the problem involves only five or six cards per player, then absolutely all the legitimate sequences of play can be inspected. As soon as you advance to larger numbers of cards (like thirteen per player?) then the computation becomes too massive for present day machines, even huge main-frames let alone a personal machine. And I am looking on the bright side!

The sort of problem that comes along in real life involves you — as declarer — seeing only dummy. If asked how best to play the hand, an exhaustive search would involve creating and testing all possible ways of distributing the opponents' twenty-six cards between them!

It all sounds impossible complex, but there are simplifying routes to be considered. Suppose the computer is set a problem involving all 52 cards but where the target is to make all thirteen tricks.

It would be completely lunatic to explore all of the avenues of play which started with the declarer managing to lose the first trick.

It is the old story — if you want to look at all the possibilities the programming is easy — it just takes a few centuries to run.

How infuriating to have a power failure in 2342 AD when one of your descendants was nearly there! But perhaps it wouldn't worry you too much!

But a more sophisticated program, taking many times longer to write, should reduce the size of the calculation by several, indeed many, orders of magnitude.

Try this very simple example — a double squeeze in a three-card ending:

Perhaps your bridge memories don't go back as far as mine but in the late 1930's Ely Culbertson sponsored Auto-Bridge. In other words, bridge for see player.

The idea was neat and simple — you slipped one of a number of reader charts into a flat container with a number of rascal hatches on the top, you opened your thirteen hatches and saw your hand. You decided on a bid, you opened another hatch to see if you had made the right bid.

If you hadn't, you read the manual to see where you had gone wrong and made the right bid instead. Then you opened your left hand opponent's first bidding hatch, found out what he had done, looked at your partner's bid and then your right hand opponent's bid. Now your next decision — right, carry on; wrong, correct — and so on.

Then the play started after you had reached the approved contract. You opened the first card hatch to your left and saw the opening lead, inspected dummy — thirteen more hatches to open. You carried on, logically

enough, by deciding on your play to each trick before opening the appropriate hatch to see if you were right or wrong.

I suppose it might have been thought of as the Charles Gabbage contribution to computerised bridge.

Now back to the 1980's. After the greatest computer that plays bridge, came a logical step. If you have your own machine then a relatively small card you can buy a plug-in add-on to your store — ROM, of course — that contains the raw material of a large number of hands, rather exciting colour graphics, sensible bidding for the hands and sensible play.

The plug-in board — produced by Intelligent Software for Tandy or compatible machines — doesn't play bridge — it just sees if you can, for it knows the hands and has been programmed to cope with whatever you try.

The release date is December 1. More details when I have had a chance to play with the package more thoroughly.

With South on lead and clubs as trumps it is easy for the human — playing the Ace of Clubs

If West discards HA you are home and dry. So West parts with SJ, dummy with the new useless HK and now East is squeezed.

Here it was relatively easy to look at all the possibilities as they were as few.

But as South required all the tricks, it would be time-wasting to examine all the sequences of play starting with a low spade from both South and North.

You see the point? Far more programming but less computation.

You can try to be too sophisticated. You remember the story of the chess computer that made a silly looking move, watched by and sneered at by many top-ranking human players?

Only later analysis proved that the machine was right in the sense that any alternative would have lost more quickly.

Who knows? Maybe exhaustive searches will still produce hitherto unknown and exciting plays on the bridge scene. Watch this space. Computer and Video Games hopes to bring you them first!

S A 3
H K
D none
C none

S K J	S Q 10
H A	H none
D none	D A
C none	C none

S 2
H none
D K
C A



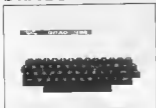
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MACHINE CODE

LEARNING A NEW LANGUAGE . . .

We have already looked at some background material on binary numbers and the structure of a computer system. Although there will be more of this background material later on, this month we will be dealing with microprocessors and some, simple assembly language instructions.

To understand assembly language we need to look inside the microprocessor. Figures 1, 2 and 3 show the internal registers (memory locations and working storage) of the 6802, 6809, and Z80 processors.

Some registers hold an eight-bit binary number and others a 16-bit binary number, and all instructions use or operate on the contents of at least one register.

There are many differences between the three processors in the number, names and uses of the registers, but there are similarities among the main registers.

The Program Counter, PC, keeps track of the address of the instruction currently being executed, and is updated automatically every time an instruction is executed.

The Stack Pointer (S in the 6802 and 6809, SP in the Z80) is used to keep track of subroutine calls and returns.

Although these registers are very important in the operation of the processor, they can be ignored in elementary programming.

The most important registers to the programmer are the accumulator, A (or two very similar accumulators A and B in the 6809) and the flags (called P for Processor Status Register in the 6802, CC for Condition Code Register in the 6809, and F for Flags in the Z80).

The accumulator is used for performing arithmetic and logical operations, and although some of these operations can be carried out in other registers there are some operations which can only be carried out in an accumulator.

The flags record information about a binary number or about the result of a calculation, and are used in binary arithmetic and in conditional jumps (the equivalent of IF... THEN GOTO... IN Basic).

The other registers differ greatly between the three processors, and will be introduced slowly throughout this series.

The first instructions we are going to look at move data between the registers and the memory. You will remember

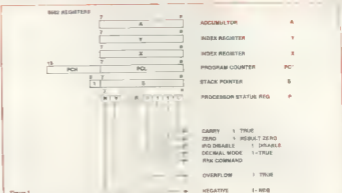


Figure 1

from last month that a memory location is selected by 16 address lines and can be specified by a 16-bit binary number (equivalent to a hexadecimal number from 0 to FFFF or a decimal number from 0 to 65536) and each memory location contains eight-bits of data (equivalent to a hexadecimal number from 0 to FF or a decimal number from 0 to 255).

Because the assembly languages are so different we will look at the processors individually.

THE 6802 AND MNEMONICS . . .

The 6802 uses the mnemonics LDA, LDX, LDY (LD being an abbreviation for load) in instructions that fetch data from memory into the registers A, X, Y, and STA, STX, STY (ST being an abbreviation for Store) in instructions that fetch data from the registers into memory.

As well as the opcode mnemonic we need an operand to indicate the memory location involved. The 6802 has several addressing modes, which are methods of specifying the memory location or register involved in an instruction, and we will begin by looking at two of these addressing modes, immediate and absolute.

In immediate addressing the actual data is included in the instruction, and a hash sign, #, is placed in front of the data to show that it is immediate data. Thus, we may write:

```
LDA #22
LDA #18
LDX #10
LDY #10
```

The assembly language allows us to use several different notations for writing numbers. Two of these are shown in

the examples above: decimal numbers, which are written in the ordinary way with no distinguishing marks, and hexadecimal, which are distinguished by being preceded by the dollar sign, \$. Thus 22 and \$16 represent the same number.

Note that, because the registers A, X and Y contain eight-bits the operand in an immediate mode instruction must be an eight-bit number (0 to FF hex, or 0 to 255 decimal).

The result of these instructions is to replace whatever was in the register by the value specified in the instruction. Obviously, we cannot use immediate addressing with the store instructions STA, STX, STY, because there is nothing to tell us where to store the number.

In absolute addressing we specify a memory location. The load instructions the contents of the memory location into a register, and the store instructions put the contents of the register into the memory location.

The instruction LDA \$1000 takes the eight-bits from memory location 1000 hex and puts them into the accumulator, while STX \$1000 takes the eight-bits from register X and puts them into memory location 1000 hex. Note that we need four hex digits to specify an address.

There are also instructions to move data between the registers TAX (Transfer contents of A to X), TXY (Transfer contents of X to Y), TAY (Transfer contents of A to Y), and TYA (Transfer contents of Y to A).

In all these instructions only the destination (register or memory location) is changed, the source data remains the same. Thus, LDA \$1000 leaves the contents of memory location \$1000 unchanged, STX \$1000 leaves the contents of the X register unchanged, and TYA leaves the contents of the Y register unchanged.

BY TED BALL

GETTING FAMILIAR WITH THE 6809

The 6809 assembly language is very similar to the 6802 assembly language. We write decimal numbers in the usual way with no distinguishing mark, and precede hexadecimal numbers with a dollar sign.

We have the opcode mnemonics LDA, LDB, LDD, LDU, LDS, LDX, and LDY to load data from memory into the processor registers, and STA, STB, STD, STU, STS, STX and STY to store data from the processor registers into memory. The mnemonic must be followed by an operand to specify the memory location to be used.

Like the 6802, the 6809 has a number of addressing modes which allow the memory location or register involved in an instruction to be specified.

The simplest addressing modes are immediate addressing where the data is contained in the instruction, and extended addressing, where the memory location to be used is contained in the instruction.

Examples of immediate mode instructions are

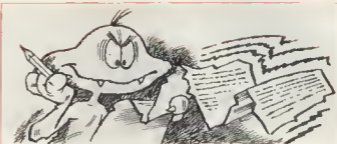
LDA #22
LDB #16
LDD #1234
LDX #1000
LDY #51000

The hash sign is used to indicate immediate addressing; decimal numbers are written with no distinguishing sign, and hexadecimal numbers are preceded by the \$ sign. Thus LDA #22 means "load the decimal number 22 into accumulator A", LDB #16 means "load the hexadecimal number 16 into accumulator B", and LDX #1000 means "load the hexadecimal number 1000 into register X".

The two accumulators, A and B, each contain eight-bits, so the operand must be an eight-bit binary number (equivalent from 0 to 255).

The 16-bit accumulator D is actually the two eight-bit accumulators combined, with A being the high order part and B being the low order part; the instruction LDD #1234 thus means "load the hexadecimal number 12 into accumulator A and load the hexadecimal number 34 into accumulator B".

The operand in a LDD instruction must always be a 16-bit number, and if we were to write LDD 1, the result of this instruction would be to put 0 in A and 1 in B. The registers U, S, X, Y, are 16 bits long and take a 16 bit immediate operand.



Some extended mode instructions are:

LDA \$1000
LDD \$1000
LDY \$1000

LDA \$1000 takes the eight-bits from memory location 1000 hex and loads them into accumulator A. A 16-bit load instruction cannot, of course, take 16-bits from an eight-bit memory location, so it uses two consecutive eight-bit memory locations.

Thus LDY \$1000 loads the Y register with the contents of memory locations \$1000 and \$1001, the contents of location \$1000 becoming the high order part of Y and the contents of \$1001 becoming the low order part of Y.

Similarly, LDD \$1000 loads the contents of location \$1000 into A and the contents of \$1001 into B.

The store instructions in extended mode work in the opposite direction

from the corresponding load instructions.

Thus, STA \$1000 puts the eight-bits from accumulator A into memory location \$1000, STD \$1000 puts the eight-bits from A into memory location \$1000 and the eight bits from B into memory location \$1001, and STU \$1000 puts the 16-bits from U into memory locations \$1000 and \$1001.

We cannot use immediate addressing with store instructions, as this is meaningless.

As well as the load and store instructions, which move data between registers and memory we have the TFR and EXG instructions which move data between registers.

The operand with these instructions has the form r1, r2 where r1 and r2 may be any two registers of the same length.

Thus we can write TFR A, B which transfers the contents of A to B leaving

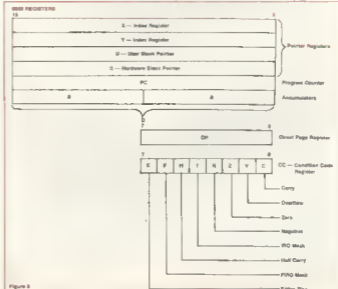


Figure 2

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A unchanged, or TFR X, Y which transfers the contents of X to Y leaving X unchanged, but we cannot have TFR A, X because A is an eight-bit register and X is a 16-bit register.

Similarly, we can write EXG A, B which exchanges the contents of A and B, or EXG U, Y which exchanges the contents of U and Y, but not EXG A, U.

THE REGISTERS IN THE Z80

If you look at figure 3, showing the registers in the Z80 you will see that there are a total of 23 registers. We are not going to look at all these at once, but we will begin with the most important the accumulator A, and the registers B, C, D, E, H and L.

The instructions to move data from memory to registers, from registers to memory, and between registers all have the form LD destination, source.

There are several ways of specifying the destination and source, leading a number of different groups of LD instructions.

We can load data directly into a register by an instruction like LD A, 10 or LD H, 15H. Note that a decimal number is written in the normal way, while a

hexadecimal number must be followed by the letter H.

Thus, LD A, 10 loads the decimal number 10 into register A, and LD H, 15H loads the hexadecimal number 15 into register H.

We can load an eight-bit number (0 to FF hex or 0 to 255 decimal) into any of the registers A, B, C, D, E, H, L, in this way. We can also treat the register pairs BC, DE, HL as if each pair was a single 16-bit register, and write, for example, LD BC, 1000H. This loads the hex number 10 into B and the hex number 0 into C.

We can also load a register or register pair from data in memory. Thus, LD A, (1000H) loads the eight-bits from memory location 1000H into the accumulator A.

When we load a register pair from memory, we must, of course, use two memory locations. LD HL, (1000H) loads the contents of memory location 1000H into register L and the contents of memory location 1001H into register H.

Note that the high order part of the register pairs BC, DE, HL is B, D, H and the low order part is C, E, L, respectively, but when we load two memory locations into a register pair the order is reversed.

If we have 34H in memory location 1000H and 12H in memory location 1001H, the instruction LD BC, (1000H)

puts 34H in C and 12H in B, but the register pair BC will be treated as if it contained 1234H.

We can store data from registers into memory by instructions of the form LD (1000H), A or LD (1000H), BC. LD (1000H), A puts the eight-bit number from A into memory location 1000H, and LD (1000H), BC puts the 16-bit number from register pair BC into memory locations 1000H and 1001H, with the 8 bits from C going into location 1000H and the eight-bits from B going into location 1001H.

There is also a group of instructions of the form LD register, register which move data between eight-bit registers; for example LD A, C moves the contents of C into A.

However, we cannot move data from one register pair into another register pair in a single instruction; if we wish to copy the data from BC into DE we must use two instructions, LD D, B and E, C.

A very important form of the LD instruction uses a register pair as a pointer to a memory location. For example, if HL contains 1000H (10H in H and 00H in L) the instruction LD A, (HL) puts the contents of memory location 1000H into the accumulator A, and the instruction LD (HL), A puts the contents of A into memory location 1000H.

Next month we will continue by looking at arithmetic instructions.

Z80 REGISTERS

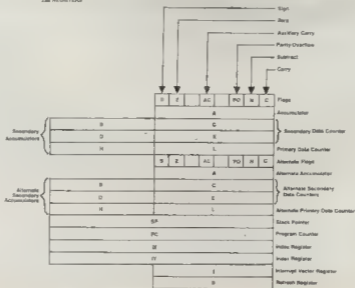


Figure 2

Adventure

PLOT OF THE GAME OF THE BOOK...

An adventure game is very similar to a story in that it must have a theme. The extent to which the game differs from a book is the degree of interaction with the plot.

This can vary from the player having no choice but to guess or deduce the correct commands, to allowing multiple choices of action at every turn.

In other words, the plot may branch endlessly. In a book, the outcome is fixed. In real life there is an infinite choice of actions, each with vastly differing results. An adventure game falls between these two extremes.

Perhaps this explains the popularity of Adventure, it is fiction in which the reader participates and affects the outcome.

Depending on the player's actions he can change the storyline to a certain extent.

A verb is the key to an action. We can look at all the different circumstances in which the verb may be uttered, and vary the outcome accordingly. The greater the number of different circumstances which can change the effect of using a particular verb the nearer the game will be to real life.

Of course, on a micro this will have a definite limit, but with cunning we can disguise that limit to a certain extent. Let us take as an example the word LOOK, often synonymous with EXAMINE in an adventure. LOOK AROUND has the

potential to produce a different reply for every location, and then some more, giving additional clues about hidden features, such as a secret exit, whilst LOOK HOLE may produce a reply like "I see a bottle of rum".

It may be arranged for the bottle to then be displayed as a normal visible object.

The outcome of the game will be affected, since it might be that without the rum a pirate will not be so helpful, and thus might eventually be crucial to the game.

The program code to achieve these multiple replies can be relatively short.

```
3998 REM ***** LOOK (EXAMINE)
*****
4000 IF K2 <> (code for AROUND)
THEN 4500
4010 ON PN GOTO 4100,4110,
4120,4190 ... etc.
4100 LET Q1$ = "THERE'S A BOAT
ON THE HORIZON" : GOTO100
4110 LET Q1$ = "I SEE A SECRET
PASSAGE" : GOTO100
4120 etc.
4190 LET Q1$ = "I SEE NOTHING
SPECIAL" : GOTO100
```

Thus last line is the reply dreaded by all Scott Adams fans, and is the default line where no specific reply is required.

LOOK (object) implies EXAMINE and requires a different approach. First we must check whether the object is in the player's current inventory, or if it is visible in the player's current location. Assuming there are 30 objects in the game, then:

BEWARE THE RIGELIAN HOUND

Strange Odyssey is yet another of Scott Adams' offerings, and has a science fiction theme. The hardy adventurer finds himself in a broken down spaceship somewhere on the surface of the moon.

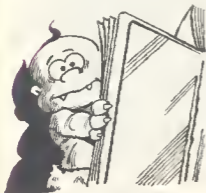
A good space traveller will of course know what precautions to take and how to use low gravity to advantage. A good adventurer will need similar insight!

Armed with a phase: it is quite likely that the explorer will come to an alien room and discover the way to travel to strange worlds. He might visit, for example, an intergalactic zoo and become the prey of a Rigelian diatice hound — not a beast to endear itself to any but the most devoted of dog-lovers!

```
4500 IF K2 > 30 THEN 4800 : REM
SUBSCRIPT IN RANGE FOR 4510
4510 IF P(K2) <> 50 AND P(K2) <>
LN THEN LET Q1$ = "I DON'T
SEE IT HERE" : GOTO 100
4520 ON K2 GOTO 4530,4190,
4540,4190,4550 ... etc.
4530 LET Q1$ = "IT SAYS: BEWARE
THE SLEEPING DRAGON" :
GOTO1000
4540 LET Q1$ = "THERE ARE 2
LEVERS — RED & GREEN" :
GOTO100
4550 etc
```

Note the use of the existing default line to avoid writing it twice. Line 4500 checks that K2 isn't greater than the highest permissible subscript set by the DIMension of the array P.

You can thus see that the limit to the different response to LOOK are set only by the computer memory available and the author's imagination!



Or he might get trapped in a methane snow storm and run out of oxygen. The object is to collect treasures of ancient alien civilisations and store them — where? Ah-ha! Can you get there? Can you mend your crippled ship? And can you climb slime holes?

This game, as might be expected from Scott, is not easy, but it is fun. It emulates many features from science fiction books and movies — if you are a science fiction fan you should find your way around easily enough!

Strange Odyssey is written in machine code, and versions are available for the TRS-80, Video Genie, Apple, Sorcerer and Atari computers. Thanks to Rh Herding of Motimox for the review copy.

BY KEITH CAMPBELL

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Warpath is set in a Wild West scenario. A group of troopers are making their way through Indian country to relieve a beleaguered garrison. They win if their flag is carried successfully to the gates. The Indians, on the other hand, are intent on removing the garrison from their territory. They win by capturing either the garrison's headquarters or the flag.

Whilst the troopers have the greater firepower, this is matched by the increased mobility of the Indians so that the game is fairly evenly balanced. It is a relatively simple wargame. The rules, by modern wargame standards, are not complex but despite this it can produce interesting situations.

This is your chance to change history and be remembered as the hero that saved Fort Chetavick! Or perhaps you would prefer to be known as the Indian Chief that saved the West and kept his tribe out of the reservations.

In this series of articles I am going to explain some of the techniques used to develop my wargames using Warpath as a typical example. Although it was written for the TRS-80 Level II it is intended to provide sufficient detail to enable it to be modified for any computer. As we progress we will introduce the rules of play and list further routines until we have a complete wargame. As well as taking part in an interesting project, it is hoped you will find the ideas helpful in your own programming.

First, an explanation is necessary. Warpath contains 174 lines in multiples of 10 (i.e. from 10 to 1740). To avoid any subsequent confusion, every line will be printed exactly as it appears in the program. This will mean that occasionally lines will include references to subroutines which, if they are not relevant to the current article, are not listed. To ensure that the program runs properly without them, I have simply



WARPATH

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added a RETURN at the appropriate line with the remark, "STUB". See lines 860 and 980 for examples. These will eventually be filled out and completed.

For those of you who are unfamiliar with wargames, let me first describe the hex. Most games are played on a board divided into squares so that pieces may move in four or, if you include diagonals, eight directions. But squares are a problem in wargames because a piece moving diagonally will, in fact, move further than a piece moving, say, North or West.

This difficulty has been overcome by dividing a map into regular hexagons, or "hex" for short (see figure 1). Whilst the number of possible directions is

reduced to six, you will see that all distances are equal. I have adopted the hex as standard in all my wargames with the exception of Turtle and Track, which uses squares.

We are going to start by describing Bigscreen and Window. These are the basic elements of the program and were designed so that several wargames could be devised (*Kriegspiel II* and *Up Periscope!* use the same module). Instead of an area of 120 hex which fills the video screen, the map is held in a separate part of memory and only the relevant section appears on the screen. This large map is called Bigscreen and contains 31 rows of 128 print locations. The video is regarded as a Window

looking over a portion of the map.

Bigscreen is an array of 3968 bytes and can hold a map of 496 hex (see figure 2). The numbers represent the first print position for the pieces. Figure 3 shows the layout of the Window. It starts at the print location 132 and consists of 11 rows of 56 bytes leaving room for messages and the map co-ordinates. It displays at any time an exact image of a portion of the map.

You should examine both arrays carefully and, in particular, note the way that the hex are laid out. We will discuss them in more detail later when we look at the movement of pieces. In a program of this nature many of the routines are concerned with searching the hex



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Right now we have to try and relate the Bigscreen positions to the Window. If a piece is at location ML on Bigscreen, how do we decide what part of the map should appear in the Window? In the wargame, it is desirable that the current piece being moved be in the centre of the Window so that it can "see" in all directions.

An algorithm is needed which, given ML — the location on the Bigscreen, will calculate: N7 — the address of the top-left corner of the selected rectangle, and SP — the position at which the piece will appear on the screen. Unless the piece is near the edge of the map, SP will be 476.

The following routine will perform these calculations:

```
Z=128 R=MLAND127 Q=INT(ML/128)
IFR<28 THEN SP=132+R*N7=DELSE IFR
>92 THEN SP=60+R*N7=72 ELSE SP=156:
N7=R-24
IFQ<6 THEN SP=SP+64*Q*RETURNELSE
SP=SP+320
IFQ>24 THEN SP=SP+64*(Q-25)*N7
N7=2560-RETURNELSEN7=N7+Z*
(Q-5):RETURN
```

Looks complicated, doesn't it? Try it. Type the lines in, INPUT various values for ML and PRINT out the values SP and



N7. Most of the routine is spent checking to see if the piece is near the edge.

Once we have made the calculation, the correct part of the map is transferred to the Window and after we have carried out the player's move, the updated image is transferred back to the map. It is, of course, very important that we do not disturb ML during this process.

Unfortunately, transferring the map to the Window or copying the Window back to the map is very slow in Basic and so we must use machine language to perform these functions. Never used this before? Well, don't worry: I am going to make it as straightforward as I can so that you can't go wrong.

Strings are used in the program to save memory. Compared with DATA statements and other methods of using machine language in Basic programs, strings are very efficient in terms of convenience, time and space. In general, an 80% saving is realistic — you can see this by comparing the length of lines 3000 to 3021 with the length of lines 1540 to 1560 which will eventually contain the DATA. However, strings do have disadvantages: the lines containing them cannot be edited or listed and neither 34 nor zero should be used since these have special meanings to the Basic editor.

In the Basic listing that follows we shall use DATA to create a string of machine language and then delete it from the program. For those of you that want to understand the machine language contained in the DATA, a section of the coding which performs the algorithm above is shown in Figure 4. You can see that the second column matches the DATA statements.

The program contains a loader which converts the code held in DATA statements to strings and a driver to demonstrate the Bigscreen routine. It is important to fill XS(1) with exactly 232 characters, XS(2) with 33 and XS(3) with 57. You will find that the editor will refuse to accept line 1540 in one shot (the limit is 240 characters including the line number), so type as much as you can, and then enter the EDIT mode and press X. You will be able to add the additional characters at the end. Finally, make sure you save the program.

When you run it, there will be a pause while the strings are created. The program will stop if it discovers errors in the DATA lines. XS(3) is used to clear the Bigscreen by loading each byte with 128. Do not use the space (or 32) if you intend using graphics since you cannot manipulate the pixels. XS(1) is used to get the appropriate rectangle, a character is printed in the Window and then XS(1) is used again to put it back.

Finally, the Bigscreen with its contents and co-ordinates is scrolled across the Window. Press ENTER to stop the scrolling.

All lines up to 1740 which are multiples of 10 are extracts from the wargame. Eventually, all other lines can be deleted but we will keep them until all the strings are complete. Finally, here

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11	224	232	240	248	256	264	272	280	288	296	304	312	320	328	336	344	352	360	368	376	384	392	400	408	416	424	432	440	448	456	464	472
21	288	296	304	312	320	328	336	344	352	360	368	376	384	392	400	408	416	424	432	440	448	456	464	472	480	488	496	504	512	520	528	536
31	488	496	504	512	520	528	536	544	552	560	568	576	584	592	600	608	616	624	632	640	648	656	664	672	680	688	696	704	712	720	728	736
41	728	736	744	752	760	768	776	784	792	800	808	816	824	832	840	848	856	864	872	880	888	896	904	912	920	928	936	944	952	960	968	976
51	994	1002	1010	1018	1026	1034	1042	1050	1058	1066	1074	1082	1090	1098	1106	1114	1122	1130	1138	1146	1154	1162	1170	1178	1186	1194	1202	1210	1218	1226	1234	1242
61	1274	1282	1290	1298	1306	1314	1322	1330	1338	1346	1354	1362	1370	1378	1386	1394	1402	1410	1418	1426	1434	1442	1450	1458	1466	1474	1482	1490	1498	1506	1514	1522
71	1574	1582	1590	1598	1606	1614	1622	1630	1638	1646	1654	1662	1670	1678	1686	1694	1702	1710	1718	1726	1734	1742	1750	1758	1766	1774	1782	1790	1798	1806	1814	1822
81	1874	1882	1890	1898	1906	1914	1922	1930	1938	1946	1954	1962	1970	1978	1986	1994	2002	2010	2018	2026	2034	2042	2050	2058	2066	2074	2082	2090	2098	2106	2114	2122
91	2162	2170	2178	2186	2194	2202	2210	2218	2226	2234	2242	2250	2258	2266	2274	2282	2290	2298	2306	2314	2322	2330	2338	2346	2354	2362	2370	2378	2386	2394	2402	2410
101	2450	2458	2466	2474	2482	2490	2498	2506	2514	2522	2530	2538	2546	2554	2562	2570	2578	2586	2594	2602	2610	2618	2626	2634	2642	2650	2658	2666	2674	2682	2690	2698
111	2736	2744	2752	2760	2768	2776	2784	2792	2800	2808	2816	2824	2832	2840	2848	2856	2864	2872	2880	2888	2896	2904	2912	2920	2928	2936	2944	2952	2960	2968	2976	2984
121	2994	3002	3010	3018	3026	3034	3042	3050	3058	3066	3074	3082	3090	3098	3106	3114	3122	3130	3138	3146	3154	3162	3170	3178	3186	3194	3202	3210	3218	3226	3234	3242
131	3270	3278	3286	3294	3302	3310	3318	3326	3334	3342	3350	3358	3366	3374	3382	3390	3398	3406	3414	3422	3430	3438	3446	3454	3462	3470	3478	3486	3494	3502	3510	3518
141	3554	3562	3570	3578	3586	3594	3602	3610	3618	3626	3634	3642	3650	3658	3666	3674	3682	3690	3698	3706	3714	3722	3730	3738	3746	3754	3762	3770	3778	3786	3794	3802
151	3830	3838	3846	3854	3862	3870	3878	3886	3894	3902	3910	3918	3926	3934	3942	3950	3958	3966	3974	3982	3990	3998	4006	4014	4022	4030	4038	4046	4054	4062	4070	4078

Figure 2

	132	140	148	156	164	172	180
280	280	288	296	304	312	320	328
260	260	268	276	284	292	300	308
388	388	396	404	412	420	428	436
456	456	464	472	480	488	496	504
516	516	524	532	540	548	556	564
584	584	592	600	608	616	624	632
644	644	652	660	668	676	684	692
712	712	720	728	736	744	752	760
772	772	780	788	796	804	812	820

Figure 3

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[illegible]

Figure 1

1. <http://www.aphis.usda.gov>

Appendix 1

Source: *Statistical Abstract of the United States*, 1997, Table 1102, "Population by Age and Sex." <http://www.census.gov/states/ny/tables/1102.html>.

are a few notes on some of the lines in the program.

Line 10 — Why do I perform this GOTO 760? I have learned that it is a good idea to put my subroutines near the beginning of the program. There are two reasons for this.

- The interpreter searches for line numbers from the beginning of the program and so it is marginally faster. I experimented with this in a program on the ZX81 and found that I could save several seconds by moving a subroutine from line 9000 to line 20.

- It saves space. GOSUB50000 costs 3 bytes but GOSUB50 only costs 3. You will discover that I am a byte-miser and will try anything if I can save a few bytes as a result. You can see therefore that by jumping to line 760, I leave room for subroutines.

Line 190 — POKES U and U+1 with the value of P which must be between 0 and 32767. POKE is a marvellous instruction to try out on a friend, but wait until he has typed out a long program without a single SAVE!

Line 390 — O is the GET/PUT flag. If O=1 copy BIGSCREEN to WINDOW; if O=0 copy WINDOW to BIGSCREEN. Don't forget that although USR will



WARPATH

to be continued
next month

accept only one argument up to 32767, you can use compound arguments. In this case, I want to pass the variables ML and O. Since ML ranges from 0 to 3968 in steps of 8, I am able to use Bit 0 as the GET/PUT flag.

Line 440 — Obtain the address of the string in XS(V). If your computer has VARPTR then rejoice! It's missing on the ZX81 which makes using machine language somewhat cumbersome.

Line 760 — Sets MEMORY SIZE. You must use CLEAR before and after GOSUB 190. This method avoids having to remember the size each time the program is run. Many types of Basic already have this built in.

Line 1110 — The machine language routines often call other routines. This would involve POKING new addresses each time the program is run and could cause problems with 34 and zero. Instead, a fixed jump table is used (see variable RU) and its address coded into the routines.

Once you understand the principles, experiment with the routine. Remember that ML must always be an even number otherwise it will upset the GET/PUT flag. Next month I shall continue with the Internal Board and the Pace Table which looks at the make-up of the cavalry garrison and Indian tribe.

FIGURE 4

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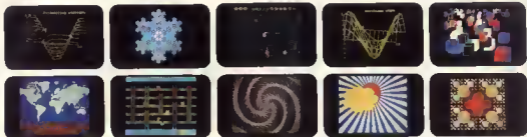
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IN-BETWEEN THE LINES

To produce graphics that move, a technique known as "in-betweening" can be used to automatically give the stages in an animated sequence.

As its name suggests, when given starting and finishing pictures, the technique will provide all the frames in between, and in the correct order. This method has been used in one form or another to help automate the production of cartoon films.

Computers have been adopted to relieve artists of the routine tasks of creating the in-between frames for many sequences.

To begin with a simple example, the frame that is half way between a square and a tall thin rectangle can be constructed as shown in figure 1. The dashed lines show the paths from the points on the first frame to the corresponding points on the last frame. The frame that is half way between the first and the last is virtually half way along these paths.

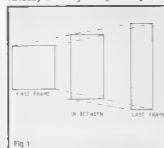


Fig 1

The in-between frame in this example has the shape that we would expect. It has been produced entirely by geometric means, and any number of in-between frames could have been generated in essentially the same way. It only remains to develop a program to carry out the same process.

In writing the program, we must first decide how a picture is to be stored, since we must provide the initial and final pictures. We can do this by storing the column and row positions of every point that has to

be joined up in order to draw the picture in two arrays

We shall store the column and row positions respectively for the first picture in the arrays XF and YF, and for the last picture in the arrays XL and YL.

The following program will then draw the first frame, an in-between frame half way between the first and last frames, and then the last frame. It assumes that the frames are each drawn by joining 25 points, but this number can be changed throughout to any other

```

10 DIM
   XF(25),YF(25),XL(25),YL(25)
20 REM ENTER COLUMN AND
   ROW POSITIONS
30 REM FOR FIRST AND LAST
   FRAMES
100 REM DRAW FIRST FRAME
110 MOVE XF(1),YF(1)
120 FOR J=2 TO 25
130 DRAW XF(J),YF(J)
140 NEXT J
200 REM DRAW IN-BETWEEN
   FRAME
210 MOVE (XF(1)+XL(1))/
   2,(YF(1)+YL(1))/2
220 FOR J=2 TO 25
230 DRAW (XF(J)+XL(J))/
   2,(YF(J)+YL(J))/2
240 NEXT J
400 REM DRAW LAST FRAME
410 MOVE XL(1),YL(1)
420 FOR J=2 TO 25
430 DRAW XL(J),YL(J)
440 NEXT J
    
```



Fig 2

The program can be developed further to draw any number of frames in between the first and the last. The program is written so that the user can enter the number of in-between frames that is required. The program is obtained by replacing all the lines with line numbers in the two-hundreds in the previous program with the following segment.

```

200 REM DRAW ANY NUMBER
   OF IN-BETWEEN FRAMES
210 INPUT "NUMBER OF IN-
   BETWEEN FRAMES",NF
220 FOR I=1 TO NF
230 X=(XF(1)*(NF+1-I)+XL(1)*I)/
   (NF+1)
240 Y=(YF(1)*(NF+1-I)+YL(1)*I)/
   (NF+1)
250 MOVE X,Y
260 FOR J=2 TO 25
270 X=(XF(J)*(NF+1-I)+XL(J)*I)/
   (NF+1)
280 Y=(YF(J)*(NF+1-I)+YL(J)*I)/
   (NF+1)
290 DRAW X,Y
300 NEXT J
310 NEXT I
    
```

The sequence shown in figure 2 was produced with this program. In order to generate realistic sequences, the initial and final frames should not be too dissimilar. However, when very different frames are used for the first and last ones, some very interesting, and sometimes artistic, results can be obtained.



FTWARE SO FTWARE SOFTWARE SOF

REVIEWS



ALL THE KING'S MEN PLAYING AROUND WITH VIC

VIC CHESS

So you want to play chess on the Vic? Well we looked up three ways of turning the Vic-20 into a chess opponent.

Let's start with Commodore's offering, *Sargon II*, which comes at £21.70 in cartridge form and has the advantage of not needing any additional memory.

The board display is easily distinguished and it does offer the most comprehensive set of instructions for use.

Chess is the sort of familiar game which you need a lot of instruction on and the *Sargon II* package does give a very complete rundown on its six levels.

Sargon II has a good response time and also plays a very fair opening without ever suggesting it had any book theory crammed into its memory.

Contrary to chess players who feel that a machine should be judged on the number of different levels it boasts, six is quite enough and probably more than most chess players will find a use for.

It is hard to fault this well-presented cartridge except on price which does not compare favourably with its two rivals but remember that both of these will need additional memory to play. It is available from all good Commodore dealers.

- Getting Started 10
- Value 8
- Playability 7

Boss is a chess phenomenon. How its German programmers managed to get it to play as well as it does on just the basic Vic-20 and an 8K memory expansion is beyond me.

It has tonight-to-nine levels of play which take you from a one second to four hours response time but my own favourite was level 2 which responded in five seconds on average.

There is a good book opening understanding built into this program and it followed a Sicilian Defence through to the sixth move before attempting the unusual.

Perhaps the most impressive thing about *Boss* was that it never seemed to stop trying in a game and even when I had given games up as draws it still attempted to gain something positive from the positions.

Boss's display is the best of the three and it accepts loss key move entries. It also runs independent chess clocks on both players and offers the additional challenge of trying to beat it while only taking five seconds per move.

On the minus side, it is difficult to spot the moves as the pieces don't flash; there are some terse instructions and it displays the mate and stalemate comments in German. Also it took me three loads the first time to get it into a Vic. It costs £14.95 from Reading-based Audiogenic.

- Getting started 6
- Value 5
- Playability 8

Bug Byte's advantage is on the price side but it has also done away with the over-used notion of chess levels.

It also offers a menu enabling you to change how far the computer looks ahead, list out the moves made, set up chosen positions or save the current position.

The tape loaded last time everytime but you need a full extra 16K's worth of memory to play it.

The *Bug Byte*'s display was the least impressive with the King and Queen symbols initially confusing.

The program gets around the need for levels by letting the player input a three figure number from 0 to 999.

The number before the decimal point is the moves it looks ahead, the number after refers to the number of moves the computer will consider at each play.

Playing the Sicilian Defence this program also went "out of book" after two moves.

From Liverpool-based *Bug Byte* at £7.

- Getting started 5
- Value 7
- Playability 5

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SOFTWARE SOFTWARE SOFTWARE REVIEWS

MASTERING THE ROGUE ROCKS

Asteroids became one of the craze games of the early 1980's after the worldwide successes of such mega-games as Space Invaders and Galaxians.

It is considerably more difficult than those earlier games, where you had really only two controls to worry about. Asteroids added hyperspace, thrust, rotate left, rotate right and fire.

The game places you in control of space ship being bombarded by a shower of meteorites that come at you relentlessly from the four corners of the screen.

Using your controls you must spin your ship around to shoot the asteroids.

You can also dodge in front or behind the rocks using the thrust button.

If things get a little too hot and a collision seems certain the hyperspace button will make you momentarily disappear and then replace you at random on the screen. But this could prove as dangerous

ASTEROIDS

keyboard overlay which, although it seems just like a gimmick, is actually quite useful in Asteroids-type games where you have up to five controls to concentrate on.

My main criticism of Meteor Storm is that the thrust button has inertia, causing you to drift helplessly towards an asteroid, frenetically rotating and thrusting.

Sinclair's official software writers, Psion, entered the field with Planetoids. This is not as close to the arcade game as the Quicksilver version though the graphics are no less impressive for this.

Planetoids had the best fire mechanism of the three games tested. The missiles could be fired in quick succession and reached their targets swiftly.

The final version tested was Meteoroids



from the new software writers. Softtek.

This was not as good a version of the game as the others played. An admirable attempt had been made to simulate the rock-like texture of the asteroids but this did not work. They looked more like chewed up pieces of bubble gum.

There was really not much to choose between the other two — though for my £5 the Quicksilver version is marginally better because of its extra facilities and graphics.

- Meteor Storm**
● Getting started 5
● Value 7
● Playability 8
Meteoroids
● Getting started 5
● Value 5
● Playability 6
Planetoids
● Getting started 5
● Value 6
● Playability 7

lessly towards your ship.
The game displayed clear instructions on the screen and also showed you the value of the various asteroids and flying centers on the screen.

All three games kept a running total of the high scores but Quicksilver's Meteor Storm took you a stage further than this enabling you to enter the initials of the top ten high scorers of the session.

This version also provides you with a

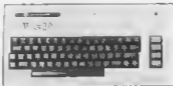
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